THE IRON AGE -- September 15, 1932

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THE IRON AGE PUBLISHING COMPANY, 239 WEST 39th ST., NEW YORK
Division of United Business Publishers, Inc.

F. J. FRANK, *President* G. H. GRIFFITHS, *Secretary* C. S. BAUR, *General Advertising Manager*

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THE IRON AGE PUBLISHING CO.
Member, Audit Bureau of Circulations
Member, Associated Business Papers

Published every Thursday. Subscription Price: United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50, including duty; Foreign, $12.00 a year. Single Copy 25 Cents

Cable Address: "Ironage, N.Y."

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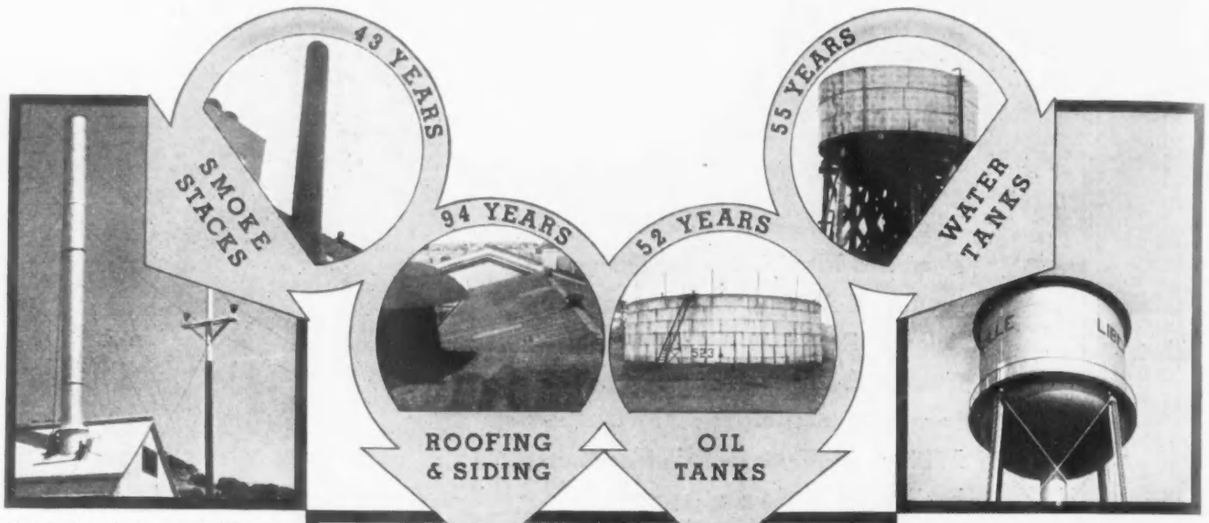

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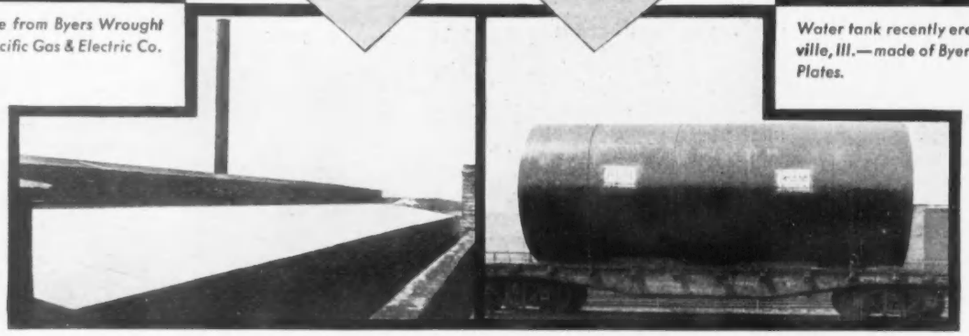

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..THE IRON AGE..

NEW YORK, SEPTEMBER 15, 1932

ESTABLISHED 1855

Vol. 130, No. 11

Outlook for Demand Challenges Steel Industry's Attention

By W. W. MACON
Consulting Editor, The Iron Age

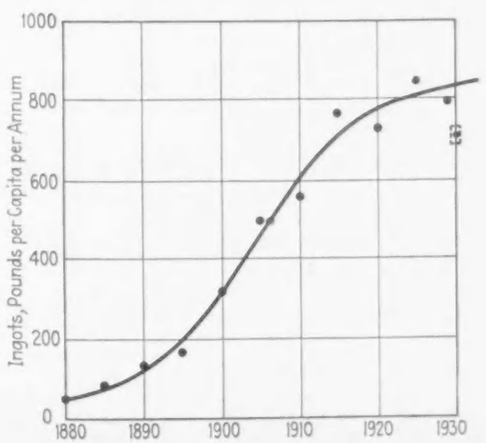
CONSUMERS of steel, its producers, and the host of executives and economists who follow its fluctuations in output as a basic indicator will do well to carefully study the accompanying article. In it, the author challenges the accuracy of the commonly used "straight line trend," as a means of projecting "normals" and thus of arriving at production surpluses and deficits.

It is pointed out that steel consumption in the 1900's expanded at the rate of 25 lb. of ingots per capita of population per annum, whereas the average increase during the last decade is about 5 lb. per person.

Must the steel industry accustom itself to an annual increase of only 300,000 tons, or can it, by addressing itself to such activities as market research, lift the rate of progress more nearly to what used to obtain?

STEEL consumption has been tapering since the world war but the fact has not generally been apprehended. Whatever the reasons, our year by year increase in production per capita of population seems to be of a diminishing order, with a substantially static condition indicated in the not distant future, unless meanwhile some large new uses for steel are found.

The challenge of the showing must be met in no small part by the iron and steel industry. It may be, as claimed by many students of human progress, that the next span of years will be marked by a lowering of the standard of living from the heights recently held. It may be that competitive materials are making inroads, though they can hardly represent tonnages comparable with those of steel. Certain it is that non-ferrous products are moving ahead, both in rolled and drawn form and in the shape of die castings, which displace machined iron and steel. Also, the plastic class



ALTHOUGH it has often been stated that steel consumption was on the way to, if it had not actually reached, 1000 lb. of ingots per capita per annum (in the banner year 1929, production was 1020 lb. per capita), the showing of the trend is that consumption at the rate of 900 lb. may not be a fact much before 1940. Even if it becomes established by 1935, the total output for, say, 130,000,000 people would be of the order of 52 millions of gross tons of ingots, or 76 per cent of today's capacity. The spots on the chart are five-year averages of production. Following are the data for the chart:

Center Year of Five	Population in Millions	Production, 5-Yr. Average, Million Tons	Ingots per Capita per Annum, Lb.
1880	50.16	1.24	55
1885	56.56	2.16	86
1890	62.95	3.88	138
1895	69.45	5.4	174
1900	75.99	11.4	336
1905	83.99	18.44	492
1910	91.97	23.08	560
1915	98.80	33.8	766
1920	105.71	34.3	728
1925	114.25	43.02	843
1929	121.	42.79	792
(1930)	(122.78)	(39.)	(712)

of materials are securing steadily a large place among manufacturers and in construction.

The trend has been hidden by the stupendous steel outputs of 1928 and 1929. It has been overlooked in all the furor about the spread of mechanization, for mechanization could mean nothing if it did not stand for intense activity in the metal working field and growing consumption of steel and iron, among other things. Yet against these developments the last ten years have shown not merely a slowing down in the utilization of steel, but actually a retrogression. Of course it will be admitted forthwith that ten years constitute too short a period to determine a trend. Moreover, it is unbelievable that today the American people are satisfied with less steel than was absorbed ten years ago.

What is the more reasonable conclusion to accept is that the per capita use will expand, as already suggested, at a slower rate than we have been wont to depend on. All of which carries the implication that the iron and steel industry must watch its step in all that it does in the direction of expanding manufacturing facilities, and it must focus particularly on the promotion of the use of steel in every possible way.

Because the habits of the people do not change suddenly, the trend of the recent past, as in production, may properly be taken as a measure of the normal needs of the immediate future. What is thus indicated as normal can be gaged against actual current production to learn whether there is a current excess or a deficiency.

Story of the Per Capita Consumption

As serving best to forecast the volume of consumption for the months immediately ahead, a chart, here reproduced, has been constructed. On this has been spotted every five years since 1880 the average per capita production for the five years of which that year is the middle. A smooth curve traced to bring the points in balance on opposite sides gives a pretty clear picture of what is going on. It shows that the rapid increase of use of steel in the 1900's was roughly 25 lb. per capita per annum, that the increase began to slacken about 1915 and it is now of the order of only 5 lb. per capita per annum. With a population of 125 million people, the increase is therefore about 300,000 tons a year, or a small fraction of 1 per cent of the country's capacity.

The last point considered in the chart in shaping the curve was that spotted on the 1929 vertical, this being the average of per capita production of the years 1927-31 inclusive. The dotted square shows where the five-year average centered on 1930 is likely to be, estimating for 1932 a higher output than is now indicated. The low position of this point shows that production of the succeeding years must jump up considerably to warp the curve much from its present course.

Certainly the outlook calls for all the enterprise and ingenuity that the industry can command. Even if the next several years should perchance average 50 million tons or more of ingots, not necessarily unthinkable, it would represent not over a 6 per cent increase in the per capita consumption, though the curve would, of course, take on a somewhat steeper slope. Today's abnormal production of under 200 lb. per capita per annum is truly abnormal, and it is far below the 840 lb. shown by the curve as normal, or the 900 lb., if we are able in the next several years to achieve a 6 per cent expansion.

Misleading Straight Line Trends

A discussion of the subject of trends and normals would not be complete without touching on the straight line trends commonly resorted to in projecting expectations. Much depends, in the straight line averaging of production figures, on how long a period is taken. It must not be so short as to allow the influence of temporary swings in demand to distort the true long-time trend. It must not be so long that conditions in the earlier years are no longer representative of those of the last end of the cycle.

A little consideration will win agreement that ten years is too short a period. Evolutionary movements do not make themselves felt short of such a term. A period of three decades is probably too long, for one has only to recall the conditions of the first years of the present century to realize how different they were from those of the third decade. It is probable that a twenty-year period is about the length of time to take to attempt an approximation of the rate of growth at the end of the period.

This matter of trend lines is mentioned in some detail because unfortunately there is a disposition in some quarters to give them undue weight. So and so's trend is ponderously announced to give the impression that it establishes the precise amount of the needs of the day, when as a matter of fact the determinations vary

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BY centering five-year averages of production, the trend of the consumption of steel is clarified for the earlier years of the 50-year reign of steel, but so great were the swings of the world-war demand and subsequently that even five-year averages fail to indicate clearly what has been the consumption rate for the last twenty years. A straight line approximation for 30 years ended with 1930 would seem to call for a rather large annual increase, while that for the last 20 years is less steep; the latter in fact shows a lower rate of increase than for any time since the early 1890's. The trend of the last ten years is actually downward.

The question that the next few years will answer is whether the per capita use of steel is being retarded. Aside from the current abnormally low output (which is at the rate of only 155 lb. of ingots per capita per annum), the indicated normal rate today is 840 lb. per capita, against 770 lb. in 1920, 600 lb. in 1910, 320 lb. in 1900, 120 lb. in 1890 and 55 lb. in 1880.

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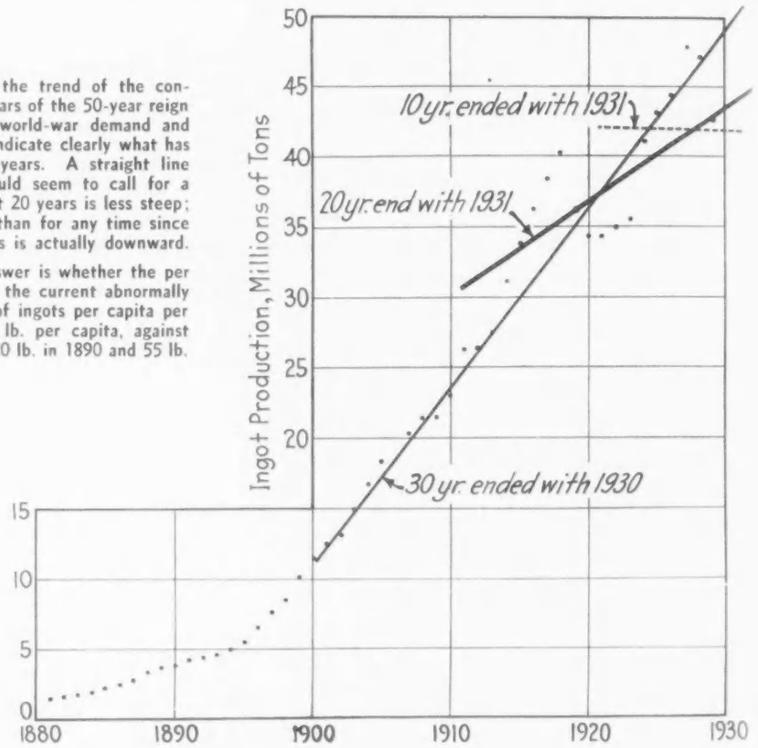


widely according to the number of years selected.

For example, steel consumption (that is, production) in the ten years ended with 1931 shows a retrogression, as already mentioned. The straight line trend for this term, mathematically calculated (equation No. 1 at the end of the article), shows an annual reduction of 25,000 tons, a result of the fact that this ten-year period began with an output of 34.5 million tons of ingots, in 1922, and ended with a production of 25.4 million tons, in 1931, while the average over the whole period was 42 million tons per annum. In other words, the trend shows a slightly lower normal consumption in 1931 than in 1922, yet it would be difficult to prove that the use of steel is abating or that there has not been a steady development of articles using ferrous metals in whole or in part.

Trend Lines Obtained by Varying Number of Years

If we take the thirty years ended with 1930 (equation No. 5), it will be found that a straight line trend will show a yearly increase of 1,231,000 tons; yet for the thirty years ended with 1931 (equation No. 6), the annual increase drops to 1,069,000 tons. More than that, the former period would call for a normal consumption in 1932 of 51,518,000 tons, and the latter, though only differing from the former by dropping 1901 from the calculation and adding 1931, would call for 48,181,000 tons in 1932, a difference of over 3 million tons for two thirty-year periods almost identical.

If such differences are shown for the two thirty-year periods, greater differences might be expected with twenty-year periods, and this is precisely so. The annual increase shown for the twenty years ended with 1930 (equation No. 7) is 1,081,000 tons, and the increase for the like term ended with 1931 (equation No. 8) is 667,000 tons. The one trend calls for a normal output in 1932 of 50,135,000 tons and the other for 44,807,000 tons, a difference of over 5 million tons.

All of the foregoing ought to be convincing that trend lines, at least long-time straight ones, are not close quantitative measures of the rate of consumption. They serve best, perhaps, to indicate the rate for the months immediately ahead and should be taken with caution for any long forecasting.

Besides approximating the expansion according to a straight trend—an arithmetic progression—a curved line may be drawn on a chart on which are plotted the figures of total production. This method can be improved on by plotting three-year or five-year averages, say. In the second chart herewith, the points are five-year averages spotted on the center year in each case. From 1880 to 1910, a curve could readily be traced without resorting to mathematics. It is clear that a straight line, or arithmetic progression, would closely describe what was happening between 1880 and 1890, but a straight line could not be approximated so easily for the next ten years. Beyond 1910 the eye would have difficulty in locating a straight or other line that would indicate a trend according to these five-year averages. Hence the resort to the mathematical determination.

Equations of Straight-Line Trends

For the sake of the record the equations of several straight line trends are here appended. The large annual increase according to equation No. 4 is the result of the world-war demand. The large annual increase in the case of equation No. 2 is owing to the fact that the period began with the abnormally low 1921, with its output of only 19 million tons, followed by uniformly high years.

Ten-year lines:

(1) The equation is $y=42.129-0.025\ x$, in which y is the number of millions of tons and x the number of years since 1921. For 1921, $x=0$ and $y=42,129,000$. For 1932, $x=11$ and $y=41,854,000$ tons.

(2) $y=28.597+2.323\ x$; x=number of years since 1920; for 1932, $y=56,473,000$.

(3) $y=11.637+1.195\ x$; x=number of years since 1900.

(4) $y=23.345+1.943\ x$; x=number of years since 1910.

Thirty-year lines:

(5) $y=12.126+1.231\ x$; x=number of years since 1900; for 1932, $y=51,518,000$.

(6) $y=15.042+1.069\ x$; x=number of years since 1901; for 1932, $y=48,181,000$.

Twenty-year lines:

(7) $y=26.353+1.081\ x$; x=number of years since 1910; for 1932, $y=50,135,000$.

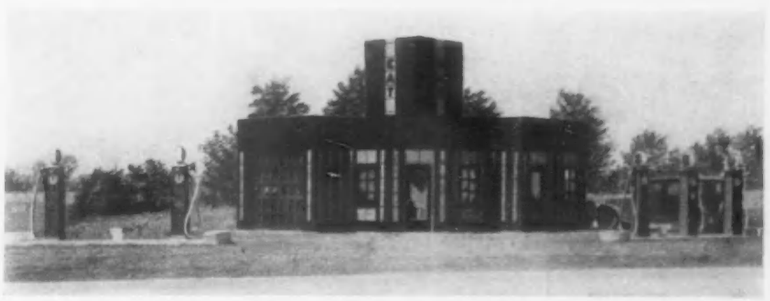
(8) $y=30.8+0.667\ x$; x=number of years since 1911; for 1932, $y=44,807,000$.

Filling Station with Porcelain Enameled Metal Walls

A METHOD of porcelain enamel on metal construction has been developed by S. M. Toussaint and J. F. Moore, of Chicago, and has been put into practice in a combination gasoline filling station and lunchroom in Chicago. The project is sponsored by the American Rolling Mill Co., Middletown, Ohio, and the Chicago Vitreous Enamel Product Co., and the Celotex Co., Chicago.

The building's exterior is finished in black and orange porcelain enamel on 17¾-in. square metal ashler sections, or flanged units into which the porcelain has been fused. The units are attached to the wood studding by means of horizontal steel bars placed 18 in. apart. They were fabricated, enameled and insulated with ¾-in. Celotex in advance of erection and are sealed with elastic asbestos cement. Through the use of this construction method and by insulating the metal sections, it was possible to construct the building with walls only 5¼ in. thick, including a 3¾-in. air space. A wainscoating of porcelain enamel has been used to finish the interior.

This new method of construction, which is applicable to any type of building, has made it possible to erect this gasoline station in less than three weeks' time. It took two men but 16 hr. to apply the exterior finish of porcelain enamel. Either a wood or steel framework may be used. A wind brace that needs no other support is provided by the steel horizontal bars which hold the sections in place. Individual porcelain sections may be inserted or removed with little effort or expense, and the building may be dismantled and moved to another location should the occasion arise.



The combination gasoline filling station and lunchroom is finished in porcelain enamel in black and orange on metal, provides for a miniature roof-garden and is surmounted by an enameled tower which, reflecting the general illumination of the station, is visible at night for several miles.

Studies of Seasonal Characteristics

By P. WALLACE SCHUBERT
The New Departure Mfg. Co.

IN measuring the variance in units per man or per hour, as affected by seasonal changes in production, there are several factors which must be taken out of the picture or distortion results. It is a common fault in such analyses to take merely surface figures and by juggling them together, produce so-called "indicative facts."

It is true that some sort of a picture results. However, such impressions are distorted by spotty values of either very high or very low variance, which cannot be called characteristic, and also by such forces as underlying secular trend.

If, then, this sort of material is not normalized, these forces, which are inherent, produce facts which are not appropriate as standard basic fundamentals, and erroneous conclusions are easily formed.

THE method of link relatives, as outlined herein, is an adaptation of W. M. Persons' method of measuring seasonal variation. The monthly data in Tables 1, 2 and 3 form the basis for a study, and are entirely fictitious, being utilized merely to act as a vehicle for conveying the principles involved. In order that the explanation may embody the greatest degree of clarity, they are carried out in the form of six distinct steps for each of the three subjects, with the production figures in Table 1 as the illustrative media for the calculations involved. The computations in all three cases are identical.

Step One—Compiling the Data

As before stated, there are three groups of data necessary. The first group consists of monthly production statistics over a number of years. The writer has found that five years constitutes an experience near enough to the present to be considered as affecting current action, and yet long enough to give a solid basis for drawing certain conclusions.

The second group and its compilation will bear a little discussion. These data are secured by obtaining weekly figures for average employees on the factory payroll, and weekly figures for total hours worked on the same payroll. These two sets are multi-

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Table 1—Monthly Production												
1927.....	2,900	2,535	2,628	2,249	2,306	2,064	2,280	1,951	1,987	2,875	2,737	2,780
1928.....	3,200	4,000	3,218	2,600	3,249	2,984	2,960	2,426	2,695	3,332	2,971	3,127
1929.....	3,472	3,469	3,744	3,253	3,302	1,952	1,864	3,491	3,179	3,236	3,531	3,662
1930.....	2,118	1,195	1,440	988	1,325	1,034	1,769	2,343	2,392	2,049	2,140	2,541
1931.....	2,210	1,688	841	1,009	1,000	1,200	1,684	1,649	1,691	2,247	2,117	2,333
Table 2—Total Man Hours—Monthly Median												
1927.....	2,805	2,710	2,771	2,500	2,511	2,451	2,583	2,404	2,522	3,030	2,910	2,895
1928.....	2,897	2,861	2,835	2,861	2,941	2,997	3,120	2,711	2,803	3,012	2,860	2,880
1929.....	3,213	3,121	3,044	3,051	2,951	2,303	2,140	3,181	3,202	3,120	3,192	3,210
1930.....	1,803	1,370	1,361	1,261	1,231	1,300	1,435	2,223	2,401	1,900	1,911	2,110
1931.....	1,539	1,251	710	1,064	1,113	1,135	1,272	1,420	1,464	1,635	1,630	1,740
Table 3—Stock at End of Month												
1927.....	1,897	2,170	2,376	2,615	3,304	3,884	4,265	2,526	1,752	1,635	1,805	1,951
1928.....	2,759	2,731	2,903	2,728	4,401	4,638	5,627	4,158	3,748	3,507	3,219	3,198
1929.....	3,319	3,342	3,986	4,237	5,514	5,821	6,189	5,908	5,462	4,549	3,911	3,517
1930.....	3,814	3,820	3,837	3,589	3,405	3,022	3,170	5,740	5,487	4,721	4,031	3,579
1931.....	2,659	2,879	2,477	2,625	2,716	2,753	2,749	3,062	2,746	2,888	2,571	2,166
Table 4—Link Relatives—Production												
1927.....	1.123	875	1,038	856	1,022	897	1,103	856	1,019	1,448	952	1,022
1928.....	1,151	966	1,039	808	1,251	918	991	819	1,111	1,238	892	1,051
1929.....	1,110	999	1,080	869	1,017	591	955	1,871	910	1,019	1,091	1,039
1930.....	578	565	1,206	686	1,341	781	1,709	1,325	1,021	874	1,024	1,188
1931.....	869	764	502	1,198	992	1,196	1,401	978	1,026	1,331	939	1,101
Table 5—Link Relatives—Man Hours												
1927.....	1,085	965	1,022	904	1,001	976	1,058	930	1,042	1,208	961	995
1928.....	1,001	986	994	1,008	1,031	1,018	1,041	869	1,036	1,071	949	1,008
1929.....	1,117	972	975	1,001	968	782	926	1,488	1,010	975	1,022	1,008
1930.....	562	759	995	919	976	1,058	1,109	1,549	1,078	793	1,006	1,108
1931.....	729	816	571	1,496	1,048	1,021	1,121	1,124	1,032	1,114	995	1,069
Table 6—Link Relatives—Stock												
1927.....	1,128	1,145	1,094	1,101	1,265	1,177	1,095	594	694	934	1,102	1,025
1928.....	1,413	992	1,062	940	1,629	1,051	1,217	739	903	934	919	994
1929.....	1,039	1,009	1,191	1,061	1,304	1,059	1,061	956	925	832	852	899
1930.....	1,087	1,002	1,004	936	949	889	1,050	1,820	956	863	854	889
1931.....	744	1,083	860	1,061	1,030	1,016	999	1,115	897	1,051	890	844

plied and a third weekly value, called "total weekly man-hours" derived. The monthly figure is derived from these weekly data *not by averaging* but by the use of a median of the four or five weekly values for each month. The median value of these weekly figures represents a truer, and normalized, index than the average. Before carrying out this point, let us learn the difference between the average and the median. Let us assume that we have five values for January, i.e., that there were five weeks in the given month. Each week showed a total man-hour value as follows:

First week.....	500 hr.
Second week.....	550 hr.
Third week.....	750 hr.
Fourth week.....	1,000 hr.
Fifth week.....	1,400 hr.

The median value would be the center unit of the series after they had been rearranged in order of magnitude, starting with the lowest (500). This gives us a value of 750 man-hours for that month. The average of the same data would be 840. Now then, supposing we wished to compare February with January. The February figures, let us say, were:

First week.....	750 hr.
Second week.....	550 hr.
Third week.....	675 hr.
Fourth week.....	775 hr.
Fifth week.....	none

In this case we have an even number of weeks. As a consequence, there is no direct, center unit. The median is then the average of the two central units after rearrangement in order of magnitude, or, in other words, 712.5. The average would be 687.5. Tabulated, these comparative values are as follows:

	Median	Average
January	750.0	840.0
February	712.5	687.5

In this case the median shows less variation because the effect of the fourth and fifth weeks of January, which were not characteristic of the rest of the data, has been eliminated. In other words, the median measures the action of the given month with all the constituents normalized, whereas the average takes in the excessive fluctuations and the index so derived forms a distorted picture.

The third group of data consists of statistics on stock left on hand at the end of each month.

Step Two—The Link Relatives

This calculation is performed for each of the three series of data. It is carried out by measuring the rate of change from month to month, i.e., one month may be higher than the preceding, or vice versa. For instance, production for January, 1927, was 2900 units (see Table 1) and in February of the same year reached 2535 units. February would then be a relative of the 87.5 per cent on January. Likewise, the relatives for each month on the preceding are computed, forming a chain of relatives throughout the series. These relative data are de-

(Concluded on Advertising Page 18)

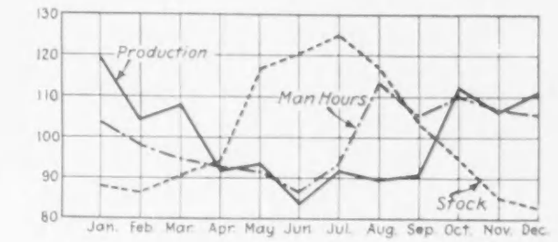


FIG. 1

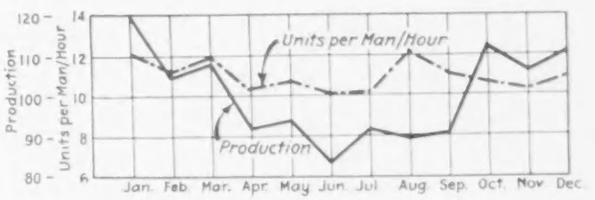


FIG. 2

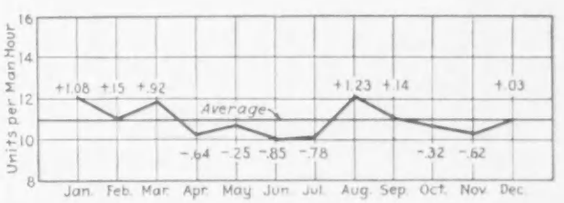


FIG. 3

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Value of r	Totals	Averages	Base or 100=
Table 7—Production																
Median link rel..	1,110	875	1,038	856	1,022	897	1,103	978	1,021	1,238	952	1,051	J×D=1,078			
Chain rel.....	100	875	908	777	794	712	785	768	784	971	924	971	r=.994			
**Adj. chain rel..	100	871	901	768	781	698	766	747	759	937	888	929		10,045	837	
Indices	1,195	1,040	1,078	917	934	834	915	893	906	1,120	1,060	1,109				
*Times base.....	28,752	25,032	25,941	22,063	22,472	20,066	22,015	21,486	21,798	26,947	25,504	26,683				2,406
Table 8—Man Hours																
Median link rel..	1,001	965	994	1,000	1,001	1,018	1,058	1,124	1,036	1,071	995	1,008	J×D=1,294			
Chain rel.....	100	965	959	959	960	977	1,034	1,162	1,204	1,289	1,283	1,293	T=.022			
**Adj. chain rel..	100	947	917	899	881	834	909	1,093	1,015	1,061	1,032	1,021		116,090	967	
Indices	1,034	979	947	928	911	862	939	1,131	1,050	1,099	1,069	1,055				
*Times base.....	2,389	2,261	2,188	2,144	2,104	1,991	2,169	2,613	2,426	2,539	2,469	2,437				231
Table 9—Stock																
Median link rel..	1,087	1,009	1,062	1,061	1,265	1,051	1,061	956	903	934	919	994	J×D=1,282			
Chain rel.....	100	1,009	1,072	1,137	1,438	1,511	1,603	1,532	1,383	1,292	1,187	1,179	r=.021			
**Adj. chain rel..	100	978	1,029	1,068	1,324	1,364	1,417	1,329	1,171	1,077	965	938		13,660	1,138	
Indices	880	861	905	939	1,166	1,201	1,246	1,169	1,031	948	850	826				
*Times base.....	30,800	30,135	31,675	32,865	40,810	42,035	43,610	40,915	36,085	33,180	29,750	28,910				3,509
Table 10																
Units per man-hr.	1,201	1,108	1,185	1,029	1,068	1,008	1,015	1,216	1,107	1,061	1,031	1,096				

*Base=Average month—1927-1931.
**Adjusted to secular trend.

Selenium as an Alloy in Rustless Steels

A NEW rustless steel which contains selenium has been developed by the Carpenter Steel Co., Reading, Pa. The outstanding effect of the addition of selenium to such steels is to render them free-machining, the new metal replacing sulphur, according to the company. It is also claimed that selenium has proved fully equal to sulphur as a free-cutting agent and that at the same time it avoids some of the objections to high sulphur content.

Selenium is a by-product of copper smelting and the manufacture of sulphuric acid. Early experimental work by the Carpenter Steel Co. was done with elemental selenium, but the losses in adding to the molten steel bath led to the adoption of an alloy of iron and selenium developed especially by the American Smelting & Refining Co. A typical analysis of this ferroselenium is:

Selenium	52.11
Iron	41.42
Carbon	0.90
Silicon	0.72
Phosphorus	0.20
Sulphur	0.22

The ferroalloy is heavier than pure selenium and is more readily assimilated by the steel bath.

Selenium Replaces Sulphur

The first commercial use of selenium steel has been in a free-machining 18-8 rustless steel known as Carpenter stainless steel No. 8. This is an austenitic steel containing approximately 18 per cent chromium, 9 per cent nickel and 0.25 per cent selenium. When this brand of free-machining 18-8 was first announced by the Carpenter company a few months ago it contained about 0.30 per cent sulphur as a free-cutting agent. The sulphur has now been replaced by selenium.

The new free-cutting No. 8 analysis is melted in high frequency induction furnaces. The steel making progresses as usual until a few minutes before the heat is ready to pour, when a carefully weighed proportion of ferroselenium is added on the surface of the metal and is swiftly carried down by the violent motion of the bath. The casting, hammering, rolling and annealing proceed just the same as any other 18-8 steel.

The finished product is so freely machinable that it can be cut in automatic screw machines at 60 to 70 per cent of the speed of Bessemer screw stock. It can be drilled, tapped, threaded and otherwise machined with ordinary machine shop tools and practice.

Some Advantages Claimed

Selenium has several distinct advantages over sulphur as a free-cutting agent. Some of these and others are pointed out by the company as follows:

Tensile and impact tests made transverse to the direction of rolling on free-machining 18-8 steel furnish an interesting comparison between the effect of sulphur and selenium as free-machining agents. Holding all other conditions equal, the selenium steels have about one-third greater elongation and reduction of area and twice the Izod impact resistance. The ultimate strength is the same.

The greater transverse toughness of 18-8 containing selenium reflects in several ways upon the fabrication and use of the product. The selenium steel is easier to roll and forge than the sulphur types—being less subject to splitting, cracking or opening up at the ends. The selenium steel can be upset with greater safety and less trouble from splitting. High sulphur 18-8 is utterly useless in the form of sheets or strips because it will stand practically no longitudinal bending and no deep drawing. The selenium steel will do both, although not so well as 18-8 steel without sulphur or selenium.

From a corrosion resisting standpoint selenium also has some advantages. It does not impair in any way the resistance to the salt spray test and it does increase the resistance of the metal to certain chemical solvents such as boiling solutions of acetic acid or aluminum sulphate.

Physical Properties at High Temperatures

The extended use of 18-8 steels for high temperature service naturally leads to the question as to what effect selenium will have on strength at these higher heats. It is obviously desirable to use a free-machining grade if possible in bolts, nuts, castings, and other parts that must be machined during the process of manufacture.

The table gives comparative short-time tensile figures for regular 18-8 and free-machining selenium 18-8 up to 1000 deg. F. The elastic limit shown is the true proportional limit determined with an accurate extensometer.

These figures show that selenium has, if anything, a very slight beneficial effect on the tensile strength at elevated temperatures. The elongation and reduction of area are appreciably lowered by the use of selenium but are still amply high to insure great toughness.

Metallography of Selenium Steel

If the extent and distribution of non-metallic stringers is the correct explanation of the greater transverse toughness of selenium stainless steel compared to high sulphur rustless, we would expect to find confirmation of this under the microscope.

That this confirmation is not lacking is shown by the accompanying photomicrographs (Figs. 1 to 4). Both the etched and un-etched sections show that the

Fig. 1 (Left).—An 18 and 8 steel with 0.30 per cent sulphur, unetched. 100 diameters. Fig. 2 is same grade of steel with 0.25 per cent selenium, unetched. 100 diameters.

selenium steel not only contains less non-metallic matter but the stringers are shorter and therefore interfere to a smaller extent with the continuity of the metal in a transverse direction.

Typical etched structures are shown in Figs. 3 and 4. It will be observed that both steels show a pure austenitic structure and that the grain size is quite similar. The absence of twinning in the selenium steel is probably explained by the etching reagent used. A satisfactory etching reagent for standard 18-8 or the same grade containing high sulphur is made up as follows:

10 cc concentrated nitric acid.
30 cc concentrated hydrochloric acid
40 cc glycerine

This is the etching reagent that was used on the high sulphur samples shown in the photomicrographs, and brings out not only grain boundaries but twinning as well. This reagent will not satisfactorily etch the selenium steel. It produces a black deposit on the surface of the steel which completely obscures the structure. This may be metallic selenium or some compound of selenium although there is no confirmation of this. Strangely enough if the selenium steel has been previously cold worked, the aqua regia-glycerine reagent will etch it fairly satisfactorily, and will reveal twinning.

For selenium steel which has not been cold worked it was necessary to develop a new etching reagent and the following mixture has been arrived at:

10 cc phosphoric acid
5 cc concentrated nitric acid
5 cc hydrofluoric acid (42 per cent)
10 cc water

This reagent was used to etch the selenium steel shown in the photomicrographs. It has been observed that this hydrofluoric reagent does not develop twinning even on 18-8 steel free from selenium and therefore the absence of twinning in the photograph is probably due to the etching reagent rather than to its absence in the steel.

A patent, U. S. No. 1,846,100, Feb. 23, 1932, covering the use of selenium in such steels has been granted to Frank R. Palmer, assistant to the president of the Carpenter organization, and it has been assigned to the company.

Table of Effect of Selenium on Physical Properties

Analysis	C	MN	SI	CR	NI	SE
Stainless No. 4	0.11	0.29	0.20	17.91	8.06	...
Stainless No. 8	0.08	0.39	0.48	17.65	8.45	0.23

Properties:

Temperature of Test, Deg. F.	Steel, No.	Elastic Limit	Tensile Strength	Elongation in 2 In.	Reduction of Area
70	4	55,000	116,500	42.2	64.2
	8	52,500	112,000	41.6	65.0
800	4	38,750	80,500	42.8	64.4
	8	39,250	83,800	27.4	61.9
900	4	35,500	75,300	41.0	64.8
	8	36,300	80,400	24.5	56.6
1000	4	32,560	71,000	37.3	65.1
	8	31,500	74,300	21.0	57.4

Speeds and Feeds in Brass Machining

In machining free-cutting brass in automatic screw machines, larger feeds and higher cutting speeds than those used in average current practice can be combined with a reasonable tool life, according to tests by L. D. Spence, in charge of tool designing for the Brown & Sharpe Mfg. Co., Providence, and Prof. James A. Hall, Brown University, who reported the results to the American Society of Mechanical Engineers. They advocate using the greatest feed that the work and tools will stand and running the stock at the highest spindle speed available.

Speed in Oxygen Cutting of Steel

Speed of metal cutting with the oxygen machine was covered in a paper read before the American Society of Mechanical Engineers at Big Win, Ont., by C. G. Bainbridge, British Oxygen Co., Ltd., London, England.

If the article is to be machined after cutting, a roughing cut can be made at a fairly fast speed, but if the article is to be used as produced, a good smooth finish is generally desired, in which case it is advisable to use a slower speed. Straight and large circular cuts always can be made at a faster speed than profile cuts, as shape cutting to a templet often involves abrupt changes in direction and a fast speed will cause the cut to drag, so that the bottom of the cut may not register quite accurately with the top. The following table shows typical oxy-acetylene cutting speeds:

Thickness of Steel, In.	Normal Speed, In. per Min.	Fast Speed, In. per Min.
½	60	90
1	46	65
1½	40	55
2	35	50
3	26	40
4	23	35
5	22	30
6	21	25
7	21	—
8	20	—
9	20	—
10	19	—
11	18	—
12	16	—
13	15	—
14	14	—
15	14	—

The cutting speed, the author added, is not proportional to the oxygen pressure; 10 or 15 per cent increase in oxygen pressure may allow the speed to be increased 40 or 50 per cent on thin material, but on thick material it may be necessary to increase the pressure 30 per cent to obtain a 20 per cent increase in speed.

He pointed out that the function of the fuel gas is to provide the necessary heat value in the flame, which is used for preheating prior to commencing the cut and for maintaining the requisite heat for cutting.

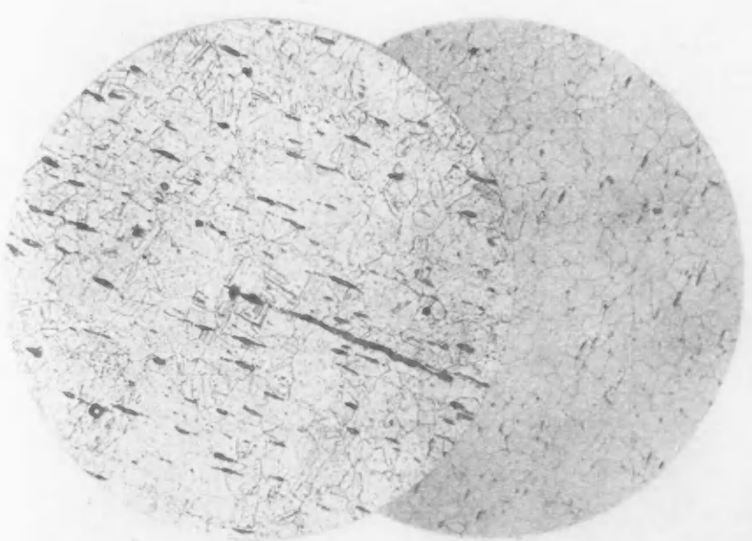


Fig. 3 (Left).—An 18 and 8 steel with 0.30 per cent sulphur, hot rolled, unannealed, etched with new solution described in text. 100 diameters. Fig. 4 is same grade of steel and same treatment with 0.25 per cent selenium. 100 diameters.

Liquid Baths for Heat Treating—Sodium and Other Cyanides

By W. PAUL EDDY, JR.
Metallurgist, General Motors Truck Corpn., Pontiac, Mich.

IN this, the second in a series of articles on liquid baths for heat treating, the author discusses case-hardened baths. The chemistry of sodium cyanide baths is taken up, followed by recommended treatments for three widely used cyanide-hardening steels. The first of the series, published in THE IRON AGE, Sept. 1, embraced oil and lead baths. Those to follow will cover various types of salt baths.

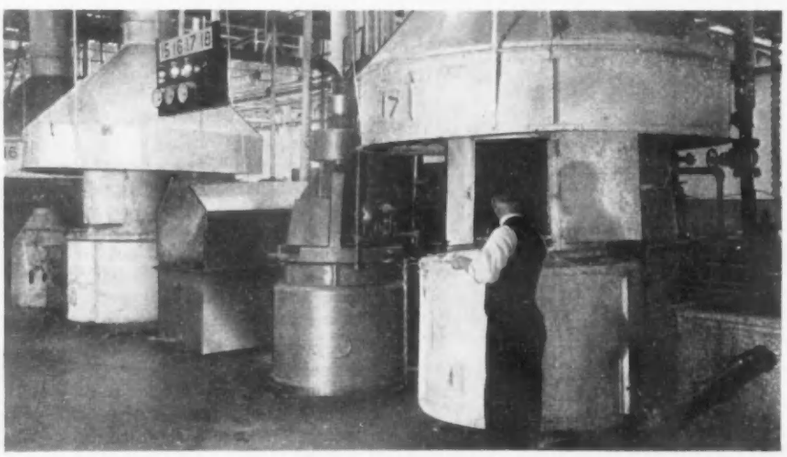
SODIUM cyanide is by far the most commonly used of the case-hardening baths; in fact, one seldom finds a shop without a cyanide pot. This method is ordinarily used to impart a very hard, wear-resisting surface to small parts, with often little or no regard for the depth of case or for the physical properties of the core.

Chemistry of Cyanide Baths

The bath is usually made up of a mixture of sodium cyanide and sodium chloride with sometimes the addition of sodium carbonate. If pure sodium cyanide be melted and used, the cyanide immediately begins to decompose and, despite frequent additions of the pure salt during use, the concentration of the cyanide in the bath drops, rapidly at first, then more slowly, until within a week or less, an equilibrium of about 30 per cent NaCN is established and maintained. Hence, there is no need of starting with more than 35 per cent of sodium cyanide in the bath; the remainder may be made up of chloride or of chloride and carbonate. The 73 to 76 per cent cyanide-chloride mixture may be used for periodic additions, to maintain the bath at the desired level, replacing the salt carried off with the work or volatilized.

The active case-hardening agent in a cyanide bath is evidently cyanogen gas, generated in the bath by the decomposition of the cyanide. For merely imparting a thin hard skin to low-carbon steel, the temperatures most used are from 1425 to 1475 deg. F. (775 to 800 deg. C.). The case produced during 15 to 30 min. of soaking at heat—the usual time—is from 0.003 to 0.008 in. thick. Carbon and nitrogen are absorbed by the steel, the file-hard case produced being due to the presence of both these elements. As the cyaniding temperature is raised, the carbon content of the case produced is slightly increased and the nitrogen content decreased.

The vapors emanating from the surface of a cyanide bath are extremely irritating to the mucous membranes of the nose and throat, although not actually poisonous; cyanide furnaces are always well-hooded and a stack provided with sufficient draft to insure complete removal of the fumes. The salt which is deposited all over the top of a cyanide furnace is largely sodium carbonate. The original sodium cyanide is, of course, a deadly poison.



Recommended Treatments

Perhaps the most widely used steels for parts which are to be cyanide-hardened are S.A.E. 1112 (Bessemer screw stock), S.A.E. 1120 (open-hearth screw stock) and S.A.E. 1020. The following treatments are recommended as least expensive for various requirements; both produce file-hard surfaces:

(1) To obtain maximum strength with minimum distortion: Rough machine; heat in oven furnace or neutral bath to 1600 deg F. (870 deg. C.); quench in brine or rapidly moving water; finish machine; heat in cyanide to 1450 deg. F. (790 deg. C.) and soak for 15 min. or longer, depending on depth of case desired; quench in oil or brine. The final quench in brine produces in the part as a whole greater strength but less ductility, and a somewhat harder case than does the oil quench.

(2) Where (1) is impracticable: Finish machine, heat in cyanide to 1450 deg. F. (790 deg. C.) and soak, quench in oil. This produces nearly the same strength, the same case hardness, but noticeably less ductility than does (1) with the oil quench

Another type of steel which is coming into common use for small, low-stressed parts is the high-manganese free-machining steel. The following procedures are recommended for this steel as being the least costly for the results obtained:

(1) To obtain maximum hardness and strength, though with considerable distortion: Finish machine, heat in cyanide to 1525 deg. F. (830 deg. C.) and soak, quench in brine.

(2) To obtain high strength with minimum distortion: Rough ma-

chine; heat in oven or neutral bath to 1525 to 1550 deg. F. (830 to 845 deg. C.), quench in brine, finish machine, heat in cyanide to 1450 deg. F. (790 deg. C.) and soak, quench in oil.

(3) Where (2) is impracticable: Finish machine, heat in cyanide to 1425 to 1450 deg. F. (775 to 790 deg. C.) and soak, quench in oil.

Other Case-Hardening Baths

In some plants, other surface-hardening baths have been substituted for cyanide. The best known of these baths is the one which employs a floating slag of calcium cyanide as the active agent, the bath itself being nearly neutral. The active agent is renewed from time to time. This process, at the usual temperatures, produces a case higher in carbon and lower in nitrogen than does cyanide and can be used at higher temperatures—1600 deg. F. (870 deg. C.) and above—to produce cases up to 0.030 in. deep. The outer 0.005 in. or so of the case obtained with this bath is extremely hard, as the absorbed 0.20 per cent nitgrogen is almost entirely confined to this depth.

Work heated in this bath is rather difficult to clean, though there are several methods—electrolytic cleaning, sand or shot blasting, brushing—which give satisfactory results. The work must be perfectly cleaned else rusting will shortly occur, due to the absorption of water by the calcium chloride present in the neutral bath mixture.

Other Uses of Case-Hardening Baths

The use of case-hardening baths is not limited, however, to the surface-hardening of low strength steels. Highly stressed parts, such as gears, made of medium-carbon alloy heat-treating steels, are often heated for hardening in such a bath, for the purpose of increasing wear-resistance not only by prevention of decarburization but by actually adding a thin nitrogen case. Further, carburized gears and other parts, either quenched from or cooled in the carburizing boxes, are reheated by some manufacturers in case-hardening baths in order to insure maximum wear resistance and freedom from soft skin.

It may appear paradoxical but, unless certain precautions are observed, these baths may actually decarburize a high-carbon surface, with the result of a very marked soft skin. This may be difficult for some to believe but it is just as true as the fact that steel, after being carburized by heating in a box with solid carburizing material, may often be noticeably decarburized while cooling in the same box.

The degree to which cyanide baths will produce soft skin on high carbon steel depends largely on temperature of heating. It is evident that, as in carburizing, an equilibrium must be established between bath and metal. As the temperature is raised, the "nitrogen pressure" of the bath drops off, so that the nitrogen content of the case produced is lowered. Thus, in spite of the fact that "carbon pressure" increases slightly as the temperature is raised, the surface of a high-carbon steel will not absorb enough nitrogen above about 1450 deg. F. (790 deg. C.) to make up in hardness for the carbon withdrawn by the bath, and the longer such work is heated the deeper will be the soft skin produced. At lower temperatures, the surfaces will be file-hard, since considerable nitrogen will be absorbed.

(To be continued)

Lacquer Veneer Provides Decorative Coating for Sheet Metal Products

FOR the decorative coating of sheet steel and other metals a process of veneering by the use of a lacquer veneer has been developed by the Di-Noc Mfg. Co., Cleveland, and has reached the point of commercial application.

Application of the process apparently will offer opportunities for broadening the use of color and increasing tone effects, and will make possible the use of a wide range of decorative designs in the manufacture of sheet metal products. The veneer in the common grains can hardly be distinguished from wood veneer and it may be applied to wood as well as metal surfaces. The product is designated by the trade name of Di-Noc Synthex veneer and the process is covered by patents.

The veneer coating is applied to the sheet in its flat form. After the steel is veneered it may be fabricated by the various forming and drawing operations, and in these it is claimed the coated surface is not stretched or otherwise marred. The veneer-coated sheet may also be fabricated by spinning. It is stated that the veneer will withstand without fracture any forming operation that the steel on which it is applied will withstand. Stampings drawn from the veneered metal do not show scoring from dies, the veneer performing in this particular the function of a lubricant. However, so far it has not been found practical to spot weld stampings made of the coated sheets, as the welding damages the surface around the weld.

Is a Development of Decalcomania Transfer Process

The process is a development of the decalcomania transfer process which the Di-Noc Co. has used for several years in the manufacture of advertising signs. By this process the printed matter or pictures printed directly on specially prepared absorbent transfer paper or a backing sheet are transferred to glass or coated surfaces to which a quick drying cement has been applied. The paper backing is removed, leaving the printed matter on the surface, which is varnished for protection. This process has been used to some extent for decorating card tables and other sheet metal products.

With the new Di-Noc process a similar backing sheet of paper is used, and on this a thin tough film of lacquer is built up. The paper is coated with a water soluble adhesive similar to that used in the ordinary decalcomania process. The gummed side of the paper is then coated with a rather slow drying solution of a cellulose ester, either alone or in combination with other substances such as rosin, rubber or gelatin. However, soluble nitrocellulose is regarded as preferable for this purpose. This coating when dried forms a thin flexible transparent film which does not distort the paper while drying. The film forms a surface which is suitable for printing by the photo-lithographic or ordinary printing methods. Ordinary printing press methods are followed in printing the design on the film. After printing, the film and the printed matter are coated with a second nitrocellulose solution which contains a mutual solvent for the substance composing the film and the carrier for the ink pigment, causing the ink pigments to permeate and to become impregnated in the film beneath and in the outside coating, which on drying has become an integral part of the film. After the film is dry a coating of adhesive material is applied.

The transfer prints or veneer may be supplied in sheet form in sizes to meet a manufacturer's requirements and stored for use. A special cement is used for attaching the veneer to the sheet. A stack of the films may be cut to any form to be applied to a portion of a stamping already made. An example of its use cut to shape is found in the Chevrolet automobile on which the transfer prints are being used for the cluster panel and cowl strip on the instrument board. A part covered with the transfer prints requires only polishing after forming, eliminating buffing operations that are usually given parts after forming.

Manifold Uses

Among advantages claimed for the process are that details of grain and lines of any figure reproduced may be brought out and the range of colors may be reproduced on the prints, offering an opportunity for quite a variety of modernistic color designs. The prints are now being made in four

(Concluded on Advertising Page 18)

Cemented Carbide Cutters in Milling

By R. E. W. HARRISON

HERE is a judicial analysis of the bigger place to be occupied by the cemented carbide cutting tool in the field of the milling of metal. The author has specialized for some years in milling and grinding machinery and in THE IRON AGE of Jan. 7, 1932, covered the situation in precision grinding. He is secretary of the executive committee of the machine shop practice division of the American Society of Mechanical Engineers.

Emphasis is placed in the accompanying article on the opportunity that is offered to tooling and designing engineers to effect a reduction in the amount of idle or non-cutting time that characterizes manufacturing milling practice. A good proportion of this idle time, which amounts to 30 per cent of the total time, is taken up in changing milling cutters. On the score that tungsten carbide cutters will operate about ten times the number of hours previously obtained on the same work with high-speed-steel cutters, it is contended that their greater use is warranted even considering negative factors in cutting-tool economics.

Mr. Harrison joins those who assert that the case is not proved that the engineering profession has a major responsibility for the present industrial situation. Because the designing and fabricating engineer is to a large measure inarticulate in his defense, the onus for the present state of affairs, he says, is hung like a species of inverted laurel leaf around his unoffending neck. Production engineers and manufacturers of production equipment, he adds, must heed the cry for lower costs,—now, tomorrow and for all times.

CONTACT and conversation with the leading manufacturers of all the industrial areas indicate that there is one common characteristic to the problem confronting our manufacturers, and that is the necessity for extracting a greater net profit per unit from a materially lower volume of business. Almost as insistent is the demand for a higher degree of quality expressed in accuracy and finish for the same or a lower price than that which was originally considered acceptable.

Constant Effort to Eliminate Machining

The last three years have witnessed many revolutionary improvements in manufacturing technique so far as cost of production is concerned. The people who make coining presses, die casting machines, hot forming and cold forming presses, and improved designs of drop forging machines; the people who handle deep drawing operations and the manufacturers of steel capable of being drawn and shaped and welded to a degree previously considered utterly impracticable, all are conspiring to eliminate costly machining operations just as in the same way the Bakelite Corpn., through its many subsidiary activities, is consistently selling the idea of molding in final and beautiful shapes, artistic articles of every-day utility which were formerly made from lumber or metal and which involved any number of shaping and machining operations.

Needless to say, the machine tool manufacturers are well aware of this trend in manufacturing technique, and while it is with tears of regret in many instances that they witness the passing of operations which have hitherto provided them with profitable orders and employment, they realize that the new technique also involves machining operations which make demands on their ability to produce better and cheaper dies, rolls and oxy-acetylene cutting and electric welding machines.

Yet New Machining Problems Arise

No better example of this can be quoted than the manufacturers of die castings. Often enough the substitution of a die casting for a previously machined part will eradicate one-half dozen machining operations. This does not necessarily sound the death knell of the maker of the equipment previously required for these operations, but throws the problem up to him again, but in a new form, in the making of the dies.

If evidence is required of the fact that the machine tool manufacturers are on their toes and ready to serve in this new scheme of things, let me commend to you a perusal of the annual review numbers of the technical magazines in which each endeavors to point out for the benefit of its readers the improved items of equipment which have been made available to them during the past year.

Suppose we take an example from current milling practice, the use of cemented carbide.

Since tungsten carbide as a cutting material was first introduced to the trade, we have been confronted by a change in manufacturing technique almost as far reaching in its effects as that which occurred when high-speed steel was first made available.

Changes Being Wrought by Cemented Carbide Tools

EXPERIENCE gained during the last two years has indicated that while tungsten carbide has made rapid advances as a cutting material, it had this in common with high-speed steel in that it had not reached a very high degree of development at the time of its introduction. Accordingly we have been slowly but surely learning something of its strong points, its weak points, and the economics governing its successful application.

One of the most constructive pieces of work in this connection has been carried out by the sub-committee on metal cutting materials appointed by the American Society of Mechanical Engineers. The third progress report of this committee was based on information received as the result of a questionnaire sent to leading manufacturers who were requested to pool their available information.

Of 85 of the most complete replies to the questionnaire, 73 of the manufacturers reported using tungsten carbide in some of their machining operations. The other ten were using tantalum carbide, usually less than 5 per cent of their total tooling.

This quite high percentage of users of tungsten carbide indicates the widespread interest in this subject. However, it is significant that the percen-

tage of tungsten carbide tools in use as compared with the number of cutting tools of the conventional materials was in practically every case quite small, even though this material has now been available for three years. This no doubt was due to the caution with which every new development is received. Thirty used over 5 per cent; twenty-three used from 1 to 4 per cent, and twenty used less than 1 per cent.

Another interesting fact brought to light was that of these 73 users of tungsten carbide, 53 also used Stellite tipped tools for their turning operations. Fourteen users out of the total of 85 reported the use of tungsten carbide in milling operations, whereas 80 reported the use of this material for turning. Also, by far the majority of users replying reported the use of tungsten carbide tools on cast iron.

Another extremely significant item in the report deals with cutting speeds, 160 to 200 ft. per min. being mentioned for continuous turning and from 100 to 140 ft. per min. for intermittent turning. These are much lower than the speeds originally recommended.

Reference to the previous reports submitted by this impartial committee indicates a steady decrease in the recommended cutting speed, brought about no doubt by the necessity for securing endurance between regrindings, as well as safeguard against breakage.

Findings in Respect to Cutting Speeds

The findings of this committee are confirmed by experience with a number of machines which have been kept under the closest observation over a considerable period of time. In these installations the cutting speed on cast iron varies from 120 to 250 ft. per minute, depending upon the depth of cut, the amount of material to be removed, the ability of the work and its supports to resist vibration, and deflection, and the conditions imposed by the necessity for keeping a milling machine unit of a production line in step with the rated production of the other machine tool units in the same line. When cutting aluminum, brass and other non-ferrous alloys and fibers, speeds greatly in excess of these are being used to advantage.

In practically all cases the tungsten carbide cutters are being used on cast iron work where the depth of cut is shallow (usually ⅛ in. or less) and the major characteristic of the work is a relatively thin box type casting with a hard scaly surface which would materially limit the speed of operation and effective life of any standard high-speed steel milling cutter.

The conclusion arrived at regarding speed is that, with tungsten carbide tools as produced today, peripheral speed when cutting cast iron can be increased from two to three times that which is used for the equivalent size of high-speed steel cutter.

Feed Rates Not So Well Established

Production executives conversant with efficient milling machine practice, realize that this increase in cutting speed is far from being the final factor in work output from the machine. In this connection, the feed rate is of prime importance, and unfortunately this element cannot be disposed of with a summary recommendation quite so easily as that which has been applied to the cutting speed. Correct feed rates when using tungsten carbide milling cutters are governed by the design of the cutter, the rigidity of its mounting and the ability of the work being operated upon to resist vibrations and deflections due to the application of pressure by the cutter. It will be readily conceded that in milling machine operations as in all metal cutting operations, the final economics are only determined on the basis of rate of metal removal in cubic inches per minute, and the idle or non-machining time.

Another major source of economy has been found in the fact that quite frequently surfaces can be milled to an excellent degree of finish and accuracy in one cut, whereas formerly both roughing and finishing cuts were required.

Rate of Metal Removal

The rate of metal removal measured in cubic inches per minute is in itself a factor of the thickness of chip per tooth which the milling cutter will consistently deliver. Experiments, careful observation and experience with installations which have operated for over twelve months under manufacturing conditions, all indicate that when using tungsten carbide milling cutters the thickness of chip per tooth should not exceed 0.015 in. for economical operation, this dimension taking into account that well-designed milling cutters mounted with maximum rigidity on heavy manufacturing type machines are used.

It should be noted that while larger chip thicknesses have been obtained, it has often followed that cutter breakage and excessive down time for changing and regrinding cutters has neutralized the savings resulting from the increased feed and speed.

The maximum rate of metal removal available on any machine tool is still, as always, a factor of available horsepower. On a manufacturing type milling machine where most favorable conditions as regards rigidity and power are obtainable, a rate of metal removal up to 2 cu. in. of cast iron per minute per horsepower can be obtained, and in those installations where the work is of such a nature that manufacturing conditions prevail, machines operate on the average at 1 to 1½ cu. in. per minute per horsepower, these figures representing current practice with good quality high-speed-steel milling cutters.

The knee and column type milling machine, while still constituting the major portion of the milling machine equipment of the tool-using industries, is, on account of its very nature and more or less universal design, a less powerful and less rigid tool, and the figure of 1 cu. in. per minute per horsepower is applicable to this tool. This figure of 1 cu. in. per min. per hp. in turn represents an improvement over that formerly applicable, due to considerable strength and rigidity having been added to the knee and column type machines. The result is that the resistance of the present designs to vibration and deflection, where the economics of the case demand it, allows these machines to utilize tungsten carbide milling cutters to advantage. In some cases the older type machines are also using tungsten carbide to advantage.

The speeds and feeds in use in the two examples referred to in the foregoing remarks involve a chip thickness up to 0.030 in., or approximately twice the maximum thickness which represents good practice with tungsten carbide type cutters. The most important conclusion arrived at as a result of the establishment of these ratios of feeds, speeds and chip thicknesses is that tungsten carbide tools will produce the most economically attractive results when applied to work where the total number of cubic inches in metal removal is small in proportion to the area to be machined.

Feed Rates May Even Be Tripled

On work of this nature it will be readily understood that with the peripheral speed of the cutter doubled and in some cases trebled, even with full account being taken of the limiting factor of maximum chip thickness per tooth of 0.012 in., it will be frequently possible for the feed rate to be stepped up as much as 50 per cent over that formerly employed with the older types of cutting materials.

However, this statement cannot in any way be made axiomatic, inasmuch as it sometimes happens that on work where the area of machined surfaces is large in proportion to the total cubic inches of metal to be removed, the sections of the casting are abnormally thin and therefore liable to distortion when subjected to a cut which represents the maximum performance of the cutter. On the other hand, this condition has frequently limited

the possible chip per tooth with a high-speed cutter to 0.012 in. or below, with the result that a change to tungsten carbide has resulted in doubling or even tripling the feed rate.

Regrindings Are Less Frequent

There is one other quite favorable factor which operates when using tungsten carbide milling cutters, this being the increased durability of the tungsten carbide material, resulting in much less frequent regrinding. A careful analysis made over a period of years indicates that approximately 30 per cent of the total time consumed in manufacturing milling operations is spent in idle or non-cutting time and a good proportion of this idle or non-cutting time is taken up in changing milling cutters.

Careful observation of the results indicates that correctly designed and applied tungsten carbide milling cutters will operate about ten times the number of hours previously obtained on the same work with high-speed-steel cutters. In other words, in the operation of manufacturing type milling machines an average of 1.44 hr. per 48-hr. week is consumed in changing cutters. This loss of time can be reduced to 0.144 hr., equivalent to a saving of 1.3 productive hours per week.

A careful study of the available data indicates that the introduction of tungsten carbide milling cutters has not materially altered the picture as regards the maximum available rate of metal removal in cubic inches per minute of the modern milling machine when working on cast iron, inasmuch as while the speed of the milling cutter is increased from two to three times, the chip per tooth is usually decreased. It should be mentioned here that the reduction in chip thickness per tooth is necessitated by the relatively greater brittleness of the tungsten carbide insert as compared with the equivalent high-speed steel cutter.

Comparing All High Capacity Cutters

It will be realized that the introduction of the tungsten carbide element into milling machine operations, far from amplifying the problem of determining the most efficient procedure, has introduced a number of variables which only a careful analysis can determine.

A spot check through a number of recent estimates discloses that although every case was most carefully considered to ascertain if the performance could be improved by using tungsten carbide material for the cutters, in only a limited number of instances was it possible to achieve a more attractive result by substituting tungsten carbide cutters for the standard high-speed steel type.

The elements which must be taken into account when analyzing production schemes similar to the cases mentioned above are as follows:

The capital investment in the machine tool and its bearing on the values of cutting time and idle time.

Their proportion and relationship to each other.

First cost of milling cutters.

Relative cost of high-speed-steel, Stellite and tungsten carbide.

Time consumed in grinding.
(It should be mentioned here that the time taken to grind tungsten carbide insert milling cutters is invariably longer than that required for high-speed-steel cutters.)

Possible deflection of work.
(Generally speaking the tungsten carbide type cutter with its smaller chip per tooth, exercises less pressure on the work than the equivalent high-speed-steel cutter, hence the introduction of tungsten carbide has made it possible to handle many jobs by milling, previously considered as surface grinding jobs only, and to machine at one cut many surfaces previously requiring two.)

Accuracy.
(The reduction in contact pressure between the cutter and work often means that the desired degree of accuracy can be obtained with one cut, whereas formerly using high-speed-steel cutters, at least two cuts would be required—one roughing and one finishing.)

Finish.
(With the smaller chip per tooth and higher number of revolutions per minute applicable to tungsten carbide cutters, a better finish on the work is obtained.)

Power.
(Tungsten carbide cutters on the average require 10 per cent more power than the equivalent high-speed-steel cutters, all other conditions being equal, due to the drag caused by the smaller angle of rake and the usually greater number of cutting points.)

Idle or Non-Cutting Time

As mentioned previously, the proportion of idle or non-cutting time to total time consumed in all types of milling operations varies from 30 per cent in manufacturing milling to 60 per cent in jobbing shop or tool-room milling, and from this it will be conceded that this phase of the work cycle is worthy of the utmost consideration; in fact, strange as it may seem to those whose major experience has been confined to manufacturing conditions, the idle time part of the work cycle still offers the tooling and designing engineer the best opportunities for effecting economies.

In evidence that it has not been overlooked, we have the introduction of the reciprocating cycle, where the operator loads one piece while the other is being machined, this involving the use of duplex work holding devices. We also have the index base method of milling, which is another variation of the reciprocating cycle permitting the operator to load and unload the machine while the milling cutter is engaged in cutting the work.

Furthermore, the last few years have seen the greatly increased use of rapid traverse mechanisms to all motions, these motions being controlled by dogs and in most cases automatically engaged and disengaged.

Another factor which has had a tremendous bearing in the attack on idle or non-cutting time has been the introduction of hydraulics used for traversing the work table, positioning sliding cutter heads in respect to the work, clamping the work, and providing an operating cycle with the utmost flexibility of control and efficiency of operation.

In addition to this a great deal of intensive thought has been devoted to the improvement in the design of manual controls, all with the object of eliminating fatigue and reducing movement on the part of the operator.

The introduction of hydraulics has accomplished another important improvement in the technique of milling, inasmuch as it has been found that work propelled under hydraulic pressure exercises a kinder influence on the milling cutter resulting in periods of usage three to four times as long as those formerly occupied between regrindings.

The more the technique of good milling practice is studied, the more obvious it becomes that with the almost two to one ratio of cutting efficiency applicable to the manufacturing type milling machine as compared with the other types, whenever possible, work should be routed as a manufacturing operation if the last word in cheap production is to be obtained.

Grinding Wheels Simplified

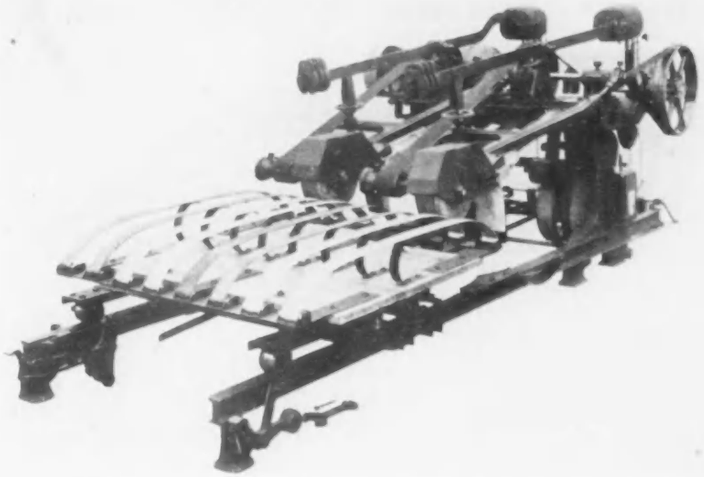
The proposed revision of simplified practice recommendation R45-32, covering grinding wheels, has been approved by the industry, according to the division of simplified practice of the Bureau of Standards. The revision includes a rearrangement of tables of standard wheels and addition of new wheel sizes. The bureau has also announced acceptance of proposed revision of simplified practice recommendation R89-32, covering coated abrasive products. Both plans are to become effective Oct. 1.

Pipe Simplification Plan Accepted by Industry

The revised simplified practice recommendation covering wrought iron and wrought steel pipe, valves and fittings has been accorded the required degree of support by the industry, and is to be effective from Oct. 1, according to an announcement by the division of simplified practice of the Bureau of Standards.

This revision eliminates from the original recommendation the 3½ in. nominal inside diameter pipe from table 3—"double extra-strong" pipe. The recommendation applies only to new installations and production of pipe.

Curved and Edge-Bent Automobile Bumpers Polished Automatically



A special attachment permits the polishing of edge-bent bumper bars. With no shut-down for loading and unloading, operation is continuous, and one man can handle two machines.

AUTOMOBILE bumpers of high curve, straight and edge-bent types are polished automatically on the No. 27B machine, which has been added to the line of the Excelsior Tool & Machine Co., East St. Louis, Ill. A uniform finish that extends almost to the eye of the bar is obtained without reversing the bumpers.

Severe wear of the wheels when passing up the curved surfaces of the work is eliminated by a mechanism that equalizes the pressure applied to the wheels. This mechanical arrangement is new and is said to have patentable features. Work-carriage travel and polishing wheel rotation are in opposite directions, and the carriage has a lateral resiliency which permits the polishing wheels to follow the contour of bumpers that are slightly curved edgewise.

The lower carriage is adjustable to any length of bumper and can be stopped at both front and back travel positions. The upper carriage is equipped with quick-releasing hold-down fixtures that accommodate eight bumpers. It is shifted sideways to the next bumper at the end of the forward or back stroke by means of a handwheel, which also actuates a locking device.

The bumpers are always in plain view of the operator. Two bars are polished at one time. They pass under the polishing wheels from two to eight times, according to the finish required, before the upper carriage is shifted to the next two bars. Operation is continuous. The operator has ample time to load and unload the fixture, so that the machine need not be stopped except for changing wheels. The wheels are raised from the work and locked automatically in the upper position by means of the two foot pedals located at the front. One man can handle two machines.

A special attachment is obtainable for polishing edge-bent bars. It consists of two brackets, bolted to the lower rail on the right-hand side, on which is fastened a retainer bar that supports a guide formed to suit the shape of edge-bent bumper. A sliding bar attached to the lower carriage has holes spaced to correspond with the exact spacing of the eight bumpers on the upper carriage. At the one end of the sliding bar there is a roller that contacts with the guide and moves the upper carriage sideways to correspond with the contour of the edge curve of the bumper bar. The arrangement is such that the polishing wheels remain on the center of the bumper during the full stroke.

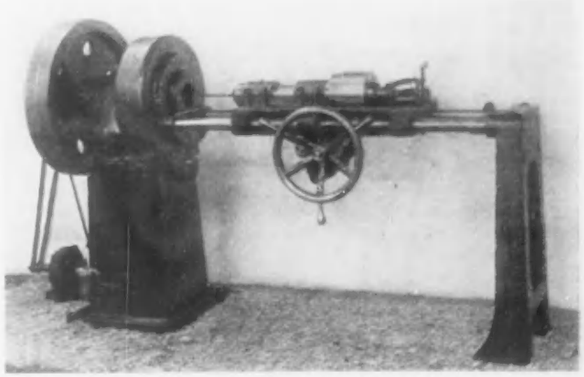
This machine is driven by a 20-hp. dust-proof ball-bearing motor with magnetic switch and push-button control. Power from the motor is transmitted by eight V-belts that have take-up adjustment. Wheel spindles are mounted in dust-proof ball bearings. The machine is provided with dust hoods and spouting and all parts are safeguarded. The weight complete is 5600 lb.

Valve Blanks Reduced by Swaging

FOR reducing valve blanks before upsetting, the Langelier Mfg. Co., Providence, R. I., has recently supplied the new type E Timken-bearing water-jacketed head swaging machine here illustrated. The machine has four dies; its use is said to eliminate turning of the valve blanks, with its attendant waste of material.

A handwheel-operated rack and pinion feeding mechanism is supplied, as well as an air chuck that grips the work automatically on the forward movement of the saddle and releases it automatically at the end of the feed stroke. Compound gears between the handwheel and pinion shafts assure ample power and easy feeding. The tendency of hot stock to twist during the swaging is offset by allowing the chuck to rotate in split bearings, the proper amount of friction being applied to control the speed of rotation. Interchangeable collets permit the swaging of any size of blank up to the capacity of the machine. The tooling furnished will handle valve steel blanks ranging in diameter from 21/32 to 25/64 in. in one hot swaging operation, although a wide range of sizes can be accommodated by changing the dies and grip collet. Blanks of any length up to 20 in. can be swaged.

Floor space required by the equipment is 30 by 90 in. The overall height is 50 in. and the weight 1800 lb.



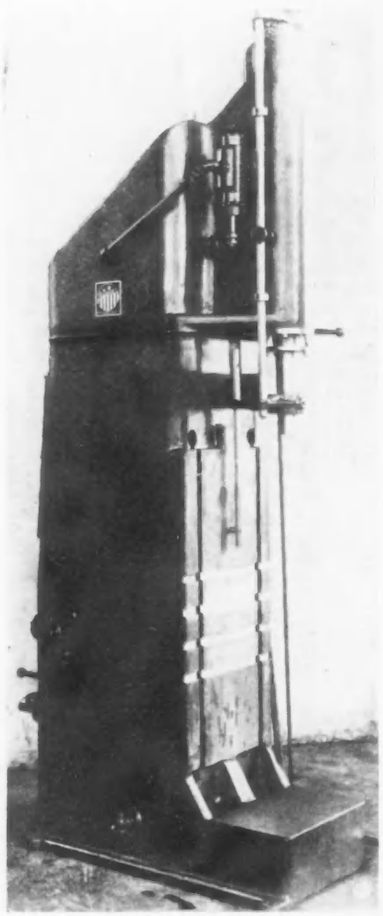
Steel valve blanks ranging from 21/32 to 25/64 in. in diameter are swaged before upsetting.

Horning Press with Hydraulic Feed

THE horning press illustrated has been brought out by the American Broach & Machine Co., Ann Arbor, Mich., as a standard machine and is built in 6-ton and 12-ton sizes.

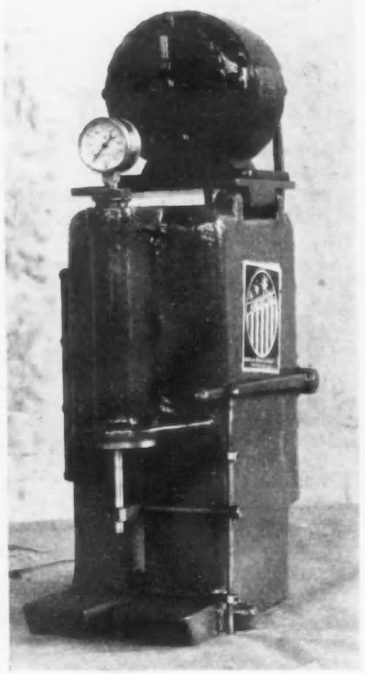
The machine is operated by hydraulic feed, the pumping unit being located in the rear of the column. The oil reservoir, formed by the column, is of 25 gal. capacity, and contains the pump within it. The pumping unit is equipped with a built-in relief valve and volume control for varying speed of the ram. The four-way balanced piston valve is controlled by foot or hand lever, and adjustable dogs can be set for any stroke desired. A direct-reading gage on the right-hand side of the machine indicates the operating pressures. The end of the ram is tapped to receive standard connections. The piston is of conventional type and is fitted with step-joint piston rings and leather cup. The front face of the column and floor plate are machined to receive fixtures or special tables. Various forms of tables can be supplied.

Specifications include: Stroke, 21 in.; distance from center of ram to finished surface, 9¼ in.; and maximum distance between floor plate and the ram, 51 in. The down speed of the ram of the 6-ton press is 20 ft. per min. and of the 12-ton press, 24 ft. per min.



200-lb. Bench Type Hydraulic Press

THE hydraulically-operated bench-type press brought out by the American Broach & Machine Co., Ann Arbor, Mich., is of 1/10-ton capacity. The press ram operates at 90 ft. per min. ram speed, and the return speed is 120 ft. per min. Stop dogs on the knock-off shaft provide for stroke adjustment. The machine is controlled by a hand lever, release of which re-

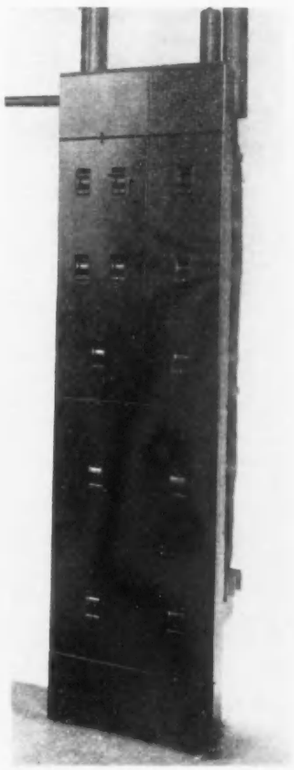


turns the ram automatically to its top or starting position. The work table is 7-in. wide and the depth of the throat is 2 in. The maximum distance between the top of the table and the end of the ram is 5¼ in.

The machine is equipped with the company's built-in pumping unit and four-way control valve, these members being built into a flanged panel, which features an adjustable relief valve that can be adjusted to suit any pressures desired up to the capacity of the machine. On the flanged panel are mounted the operating lever shaft, four-way valve, relief valve and pump, the entire assembly being accessible as a unit for adjustment and repair. The machine is driven by a ½-hp. 1800 r.p.m. motor through Texrope. The height from base to top of cylinder is 14⅞ in.; the weight, without motor, is 140 lb.

Switchboards and Panels Feature Simplicity

DISTRIBUTION switchboards and panel boards designed to meet modern installation requirements have been brought out by the Westinghouse Electric & Mfg. Co., East Pittsburgh. Ease of handling and installation, as well as simplicity and uninterrupted service, are features.



The new boards are metal built with safety dead-front and are said to provide maximum safety, convenience and economy. The new AB breakers recently brought out by the company and described in THE IRON AGE of March 24 were specially designed for such applications. Their close coordination of apparatus and application design and compact and convenient assembly structure has been developed and standardized. In the space of a 200-amp. three-pole unit, two three-pole 100-amp. units may be fitted. In a space of a 100-amp. three-pole breaker two similar 50-amp. units may be accommodated, and in like manner these two three-pole 50-amp. units by three two-pole 50-amp. units. By combining in this way breakers with various ratings any desired combination of single or multiple-pole unit for any wanted current capacity within the range of 15 to 225 amp. is readily secured.

Boards of this construction are especially suited to centers of distribution, as in small factories, large buildings, or wherever blocks of power are employed.

Business Downtrend Halted; Hopes for Sudden Uptrend Exaggerated

By DR. LIONEL D. EDIE

HAVING stressed for several months the view that the financial foundations of recovery were being laid, I naturally inquire now whether any real business improvement has been built upon those foundations.

The mere halting of a tremendous depression is constructive news. The ground has stopped slipping from beneath our feet. It would, of course, be gratifying to see an immediate upturn at a brisk pace, but it is unwise to become too impatient for a high-speed swing-back to prosperous times. The higher the hopes excited for a sensational reversal of business, the greater the danger of a subsequent let-down and disappointment in public psychology. A reasonable time factor must be allowed for if we are to have a business recovery of sustained and lasting character. The country has had enough of fake starts.

Textiles

Everybody points to textile activity as the main proof of recovery. There was due a brisk seasonal recovery in that industry, but the improvement has been more than seasonal. The reasons do not arise at the consumer end of the business, but at the producer end. Last summer, textile activity was close to zero; in many lines there were absolute shut-downs. Retailers who ordinarily would have placed orders in June or July postponed their orders for autumn and early winter until the last minute. Hence, there existed a most abnormal vacuum in the trade.

Into this situation there was injected an attempt to start a buyers' panic. This attempt started at the raw material end, and chiefly took the form of a run-up in cotton prices. The run-up was partly due to a short cotton crop, but was also partly due to exaggerated stories of a cotton shortage propagated by speculative interests.

The real test of the textile market is whether consumers will buy more cloths and clothing. Thus far, there is no sign of greater consumer buying. Department store and chain store sales fail to show it. Until there are such signs, the textile boom must be construed as mainly a filling up of last summer's vacuum in the trade, a dealers' rush to buy in the face of rising raw material prices, and, to some extent, the beginning of a two-year replacement-demand cycle peculiar to the textile industry.

It is not unlikely that before the end of the year a certain amount of distress merchandise will reappear in the textile goods markets.

Electricity Production

Many people are closely watching the weekly figures of kilowatt-hour consumption. If these figures turn up more than seasonally, such observers will take that as proof that the big turn has come. This is certainly an unsophisticated use of statistics.

These electrical figures have made just about a seasonal grade during the past few weeks. If September or October figures do show a super-seasonal gain, the achievement would have to be interpreted with due regard for the highly erratic character of the data. Each of the past three years has shown several more-than-seasonal bulges, but these were utterly misleading if anyone leaped to the conclusion that they meant a major change in business.

As a statistical series, the weekly electricity figures are an experiment. The data begin only in 1928, and the curve is so highly jagged and irregular that jerks and dips of a few weeks duration are meaningless.

Thus far, these figures suggest that business has stopped declining; that is all. Another bulge this autumn would have to be set alongside a dozen other bulges all through the depression in order to draw conclusions.

Carloadings

If electricity figures are the infants of statistical series, carloadings are the veterans. So far they show a flattening out line; that is, a tendency barely to make the seasonal grade typical of autumn. In each autumn of the past three years they made temporary spurts beyond seasonal, but these spurts were false alarms to anyone who read into them signs of speedy upturn.

Moreover, it is well to bear in mind that carloadings may have lost a great deal of their old value as measures of business activity. The new competitive situation in transportation leaves us pretty much in the dark as to what jiggles in the carloading curve signify.

Steel

The stock market, supposedly the great discounter of forthcoming events, had built up the notion that August would show a sharp increase in unfilled orders. The actual result, 3000 tons increase, debunks some of the extravagant talk of "the Street."

If the false expectations be separated from the facts, the August results show a basis for some encouragement, in that they suggest a bottom-formation in the steel industry. Steel is another series which indicates that the curve has stopped going down and that a base line is being formed upon which, given a little patience and time, real improvement may be made.

Automobiles

Sales of certain makes of cars gained in August over July, but there is doubt if sales of all makes gained. In fact, retail registrations in certain areas, the first to report, suggest August sales were below those of July. Pick-up appears to have occurred in scattered areas, particularly in New England, where textile payrolls were increased, in parts of the South where cotton prices went up, and in a few cities where stock market advances pry purchasing power loose for a few people. In spite of this spotty improvement, it is difficult to find any true signs of a broad buying advance, for the simple reason that buying power is absent.

Nevertheless, the automobile situation supplies a basis for hopefulness, inasmuch as the present period represents about the worst that can happen to the industry. Surely the next peak season, namely, the spring of 1933, should easily witness a much better motor business than that now prevailing.

Summary

Hopes of high-speed recovery are not borne out by the tangible evidence to date. If, instead of such exaggerated hopes, one is contented to find proofs of an arrest of the three-year sagging tendency in business, and the making of a base line for the depression, one is not lacking for evidence.

Railroad Credit Body Formed; 820,912 Cars Over 20 Yrs. Old

Leading Equipment Companies Organize to Take Advantage of Reconstruction Finance Corporation Loans

FORMATION of the Railroad Equipment Credit Corporation, which will finance purchases of equipment by the carriers, has been announced. Harry A. Wheeler, president, Railway Business Association and former president of the Chamber of Commerce of the United States, was elected president. William H. Woodin of the American Car & Foundry Co. and the American Locomotive Co., was elected chairman of the board, and George H. Houston, president, Baldwin Locomotive Works, heads the executive committee. Other officers are Harrison Hoblitzelle, president, General Steel Castings Corpn., who was elected executive vice-president, and George Alston, secretary and treasurer.

Companies which have subscribed to the stock in the credit corporation are the American Car & Foundry Co., the American Locomotive Co., the Lima Locomotive Works, Inc., the Baldwin Locomotive Works, the Pressed Steel Car Co., the Pullman Car & Mfg. Corpn., the Westinghouse Electric & Mfg. Co., the General Electric Co., the General Steel Castings Corpn., the American Steel Foundries, Inc., the General American Car Co. and the Bethlehem Steel Corpn. Other equipment companies, however, are eligible to the services of the corporation.

The Board of Directors

Members of the board of directors are as follows:

Samuel G. Allen, president, Lima Locomotive Works, Inc.

George B. Baldwin, vice-president, General Electric Co.

William C. Dickerman, president, American Locomotive Co.

Harrison Hoblitzelle, president, General Steel Castings Corpn.

George H. Houston, president, Baldwin Locomotive Works.

Myles B. Lambert, Westinghouse Electric & Mfg. Co.

C. A. Liddle, president, Pullman Car & Mfg. Corpn.

J. F. MacEnulty, vice-president, Pressed Steel Car Co.

R. E. McMath, vice-president, Bethlehem Steel Corpn.

George E. Scott, president, American Steel Foundries, Inc.

Lester N. Selig, president, General American Tank Car Corpn.

William H. Woodin, president, American Car & Foundry Co.

Certificates To Be Issued

The plan under which the credit corporation will function was explained fully in THE IRON AGE of Sept. 1, p. 338. Briefly, it contemplates the payment of 10 per cent in cash by the railroads, with 10 per cent in junior trust certificates and per cent in senior trust certificates. The Railroad Equipment Credit Corporation will pledge the trust certificates, amounting to 90 per cent of the purchase price, with the Reconstruction Finance Corporation, for loans amounting to 80 per cent of the purchase price. The junior notes, which will remain the property of the companies that sell the equipment to the railroads, will be retained by the Reconstruction Finance Corporation until all loans made under the plan have been liquidated.

820,912 Cars Over 20 Years Old

A survey of the potential freight car requirements of the Class 1 railroads of the country shows that 820,912 are more than 20 years old. The number owned by these roads on Dec. 31, 1930, was 2,280,221, against 2,144,151 owned on June 30, 1911. The number of new cars ordered from 1912 to 1930, inclusive, was 1,521,575, while the number retired from 1911 to 1930 was 1,914,296. Detailed figures are given for all Class 1 roads in the accompanying table.

United States Patent No. 1,868,052, covering the cadmium ball anode helical coil container, has been granted to the Udylite Process Co., Detroit. The basket or container comprises a wire helix. The convolutions are fairly widely spaced at the top of the basket, but they approach together at the bottom so as to coordinate the cage with smaller balls.

	Freight Cars Owned Dec. 31, 1930	Cars Over 20 Years Old
Bangor & Aroostook	3,565	1,615
Boston & Maine	12,778	6,178
Central Vermont	3,283	2,089
Canadian Pacific Lines in Maine	1,601	1,601
Maine Central	6,294	3,562
New York, New Haven & Hartford	23,379	17,185
Rutland	1,713	592
Grand Trunk Western	12,948	1,087
Delaware & Hudson	15,330	11,795
Delaware, Lackawanna & Western	24,761	7,554
Detroit & Mackinac	886	647
Detroit, Toledo & Shore Line	384	184
Erie	46,257	21,370
Lehigh & Hudson River	360	303
Lehigh & New England	3,511	1,604
Lehigh Valley	26,051	15,528
Montour	1,459	59
New York Central	249,482	91,456
New York, Chicago & St. Louis	19,651	7,088
Pere Marquette	16,400	1,327
Pittsburgh & Shawmut	1,572	0
Pittsburgh & West Virginia	5,565	3,265
Pittsburgh, Shawmut & Northern	479	479
Ulster & Delaware	143	70
Wabash	28,199	4,470
Akron, Canton & Youngstown	415	413
Baltimore & Ohio	113,847	32,437
Bessemer & Lake Erie	12,529	4,848
Chicago & Eastern Illinois	7,053	2,829
Chicago & Illinois Midland	1,530	32
Chicago, Indiana & Louisville	6,174	536
Detroit, Toledo & Ironton	2,600	1,049
Elgin, Joilet & Eastern	10,326	6,695
Illinois Terminal	1,952	1,722
Pennsylvania	269,526	145,746
Central of New Jersey	21,980	13,580
Reading	44,086	18,383
Western Maryland	11,146	2,696
Wheeling & Lake Erie	11,490	1,090
Chesapeake & Ohio	67,623	16,268
Norfolk & Western	48,835	2,221
Richmond, Fredericksburg & Potomac	1,264	434
Virginian	9,765	1,601
Atlantic Coast Lines	53,472	23,846
Louisville & Nashville	63,074	6,342
Columbus & Greenville	369	63
Florida East Coast	1,542	131
Georgia & Florida	614	16
Gulf, Mobile & Northern	2,887	2,386
Illinois Central	73,206	8,953
Mississippi Central	667	667
Norfolk Southern	3,274	2,314
Seaboard Airline	21,480	6,569
Southern	85,329	18,222
Tennessee Central	637	362
Duluth, Winnipeg & Pacific	1,790	639
Duluth, South Shore & Atlantic	2,657	1,347
Minneapolis, St. Paul & Sault Ste. Marie	23,193	14,143
Spokane International	255	255
Chicago & North Western	77,493	19,623
Chicago Great Western	6,209	1,983
Chicago, Milwaukee, St. Paul & Pacific	74,282	10,897
Duluth, Missabe & Northern	14,069	9,393
Great Northern	47,694	16,769
Green Bay & Western	992	792
Lake Superior & Ishpeming	1,939	1,844
Minneapolis & St. Louis	6,882	3,641
Northern Pacific	49,294	21,105
Spokane, Portland & Seattle	653	272
Bingham & Garfield	208	0
Chicago, Burlington & Quincy	69,867	19,449
Chicago & Alton	12,611	6,632
Denver & Rio Grande Western	15,629	11,786
Denver & Salt Lake	966	289
Nevada Northern	33	31
Chicago, Rock Island & Pacific	47,901	18,818
San Diego & Arizona	206	206
Atchison, Topeka & Santa Fe	89,449	26,842
Southern Pacific	76,827	27,436
Toledo, Peoria & Western	305	66
Union Pacific	57,574	24,063
Utah	1,996	1,471
Western Pacific	6,716	2,168
Burlington-Rock Island	692	692
Fort Smith & Western	1,007	1,007
St. Louis-San Francisco	35,271	11,339
Kansas City Southern	4,106	1,999
Kansas, Oklahoma & Gulf	183	183
Louisiana & Arkansas	1,758	692
Louisiana, Arkansas & Texas	173	173
Midland Valley	215	196
Missouri & North Arkansas	373	62
Missouri-Kansas-Texas	17,499	6,771
Missouri Pacific	65,936	26,977
Texas-Mexican	72	72
St. Louis-South Western	8,231	3,389
Wichita Falls & Southern	201	101
Copper River & Northwestern	196	196
Oahu Railway & Land Co.	1,054	1,054
Butte, Anaconda & Pacific	1,421	1,104
Totals	2,280,221	820,912

....OFF THE ASSEMBLY LINE....

Motor Car Makers Preparing to Take Full Advantage of Recovery Period

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DETROIT, Sept. 12.

THE automobile industry continues to prepare leisurely for the coming production season. Although change-overs are in progress in most plants, the rush and tenseness of former years are absent. Where formerly motor car companies were compelled to call upon outside agencies in securing an adequate number of tool designers and tool makers, this year there has been a plentiful supply close at hand. The only manufacturing point at which there has been even a flurry of excitement is Pontiac, where General Motors is preparing to embark on a new venture under the Pontiac division's auspices.

Yet quietly and with a noticeable absence of ballyhoo the automobile industry is setting its house in order to get the most out of the period of recovery ahead. It is keeping production down to an irreducible minimum and is cutting down dealers' stocks so that retail outlets will be in the healthiest possible condition to take care of the flow of new models late this year. Hidden in the most recent monthly figures of General Motors are some interesting facts along this line. August sales to consumers totaled 37,230 units, compared with sales to dealers amounting to 24,151 units. In other words, sales exceeded production by 13,079 units. However, this is only part of the story, for statistics for the entire year to Aug. 31 reveal that General Motors' output was 396,998 cars, as against retail sales of 415,653 cars.

Chevrolet Far in the Lead

General Motors' sales to consumers have run ahead of production in every month since February. In the last six months it has sold 41,779 more cars than it has made. Last month its sales rose above those of July, thereby reversing the seasonal trend, but its production was 6945 cars less. This conservatism, followed by other makers as well as General Motors, explains why dealers' stocks throughout the country shrunk 17,000 cars in the past month and 35,000 cars in two months.

Chevrolet has tentatively scheduled 55,000 new models and Pontiac 20,000 for the fourth quarter.

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General Motors' sales exceeded production in August for the sixth consecutive month.

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Chrysler is drawing in the manufacture of parts from outside suppliers.

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How essential Chevrolet is to General Motors is illustrated by the fact that its sales in August aggregated 29,230 cars, or 78 per cent of General Motors' total. During July it sold 26,549 cars, or 81 per cent. That is, while Chevrolet found a retail market for 29,230 cars in August, Pontiac, Buick and Cadillac-LaSalle combined sold only 8000 cars. The most encouraging disclosure is that Chevrolet's sales increased as the month progressed, the last 10-day period, with a total of 12,126 cars, being the best. During August Chevrolet's dealers reduced new car stocks and used car stocks 4000 units each. Used car stocks are 25 per cent less than a year ago and only half those in 1929.

Ford has resumed production gradually at its Rouge plant since Sept. 6 and current operations are put at 2000 to 2500 units a day four days a week. Ford's August assemblies of cars were larger than had been anticipated, raising the industry's total to 89,855 cars. Ford's body suppliers are working slack, releases being of meager proportions. Perhaps the most fortunate vendor is the Murray Corpn., the frame department of which will supply all of Ford's passenger car frame requirements the remainder of the year. It has a good schedule for this month and will operate five days a week during October. A large valve maker has received moderate-sized Ford releases, while a company manufacturing carburetors for the four-cylinder job has been allotted enough business to resume operations.

The Chevrolet foundry at Saginaw, which is planning to begin casting cylinder blocks for 1933 models on Sept. 19, has a tentative schedule of 55,000 Chevrolet and 20,000 Pontiac blocks for the rest of the year. This is an exceptionally light program and confirms the earlier impression that General Motors units will make only enough cars in the fourth quarter to sample dealers. It is understood that a new General Motors car is in the making and that it will be produced at Pontiac. The present plan is to give it a new name, but details concerning its selling price and its design are still shrouded in uncertainty.

Dodge Plant Retooling

Dodge Brothers has the most pretentious tooling program in the Detroit district, apparently in preparation for radical changes in design. Originally it expected to spend several million dollars for new equipment and actually put out inquiries for about 150 presses as well as other tools, but this program has been so drastically pared that its purchases will amount to only a small fraction of the earlier anticipated expenditures. Just how much it is spending on machine tools is not known, but a conservative estimate would be $100,000. Aside from activities in connection with new models, the Dodge revamping is part of Chrysler's program of drawing in as much parts work as possible from the outside. It is reported that wherever feasible the decision has been made to manufacture parts for Chrysler-made cars at Dodge or other Chrysler plants as soon as current contracts with outside parts suppliers expire. In this way the Chrysler management hopes to utilize idle plant capacity, give available work to their own employees and attain lower costs. Another desired

feature is the bringing of the manufacture of parts under closer control of Chrysler production officials.

Willys-Overland is making some elaborate changes in design for its new line and is getting ready to manufacture more of its parts in its own plant.

General Motors has tentatively scheduled the manufacture of 100,000 new models during the fourth quarter. Of this number, 55,000 will be turned out by Chevrolet and the remainder divided among Pontiac, Buick, Oldsmobile and Cadillac-LaSalle. It is reported that Ford will make about 25,000 cars this month and a similar quantity in October, so that it is reasonable to expect that in the final quarter it will assemble 75,000 to 100,000 cars. The Chrysler Corpn. is expected to make 50,000 cars during October, November and December. Thus, the three leading companies will account for a production of at least 225,000 units in the last quarter. This means that the industry as a whole will assemble about 275,000 cars in the final 90 days of the year as against 275,669 units in the corresponding period of last year. In other words, the fourth quarter will be the first time since September, 1929, with the exception of the single month of December, 1930, that automobile production will stand favorable comparison with the similar period of the previous year.

Detroit Notes

Chrysler and General Motors divisions may place fourth quarter steel contracts this week, although releases are not expected until later in the month. . . . The manufacture of Plymouth crankshafts is being transferred from Chrysler's Newcastle, Ind., plant to the local Dodge factory. . . . Contrary to the practice of General Motors and Chrysler, Studebaker is said to be placing more business outside because of attractive prices. . . . The steel trade is anticipating a small Ford steel buy before the end of September. . . . Detroit believes that every automobile maker will operate in the red during both the third and fourth quarters. . . . September output is virtually certain to fall under 75,000 cars, with Ford making about 50 per cent of the industry's total.

Seeks Credit Support For Purchases of Scrap

Benjamin Schwartz, director general of the Institute of Scrap Iron and Steel, conferred last week in New York with Eugene Meyer, governor of the Federal Reserve Board, and John G. Peterson, chief executive of the Commodities Finance Corporation. The conference concerned the easing of bank credit for the scrap iron industry. A suggestion has been made that a credit organization for the financing of scrap purchases be formed.

R. F. C. Grants First Loan for Southern California Water Project

Loans Will Be Granted Speedily, Including One for Tri-Borough Bridge, New York, the Largest Pending

WASHINGTON, Sept. 13.—The Reconstruction Finance Corporation today announced a loan of $40,000,000 to finance the Metropolitan Water District of Southern California project, which will consist of an aqueduct system to carry water from the Colorado River to 13 Pacific Coast cities. About 25,000 tons of structural steel will be required.

The loan will be distributed over two years, $20,000,000 for each. It is the first self-liquidating loan made. Construction work will be begun in the immediate future. The whole project involves an outlay of $220,000,000.

In addition to steel requirements, the project will call for the following items among others: 2000 tons of copper cable, various kinds of electrical equipment, drilling apparatus, 150 electric tunnel locomotives, 800 mine dump cars, 2000 tons of steel rails, 30,000 tons of drill steel, 400 tons of steel tunnel supports, several thousands tons of reinforcing bars, 15 derricks and hoists and 1000 tons of pipe for compressed air water lines. Power will be obtained from Hoover Dam.

By far the largest project on which a loan has been asked is the Triborough bridge in New York. It is believed a loan for this work will be made soon.

The project for the so-called New Orleans railway and highway bridge, calling for 65,000 tons of steel likewise is expected to be given approval for a loan. This work is to be done by both the State of Louisiana and New Orleans and financed partly by a bond issue, the remainder through tolls over the bridge which will be used by the Southern Pacific Railroad. This project is specially provided for in the emergency relief act since it is not wholly of a self-liquidating character.

Some Projects To Be Privately Financed

Other projects are to be granted loans in the near future. Meantime, a number of projects which were to be pushed by Finance Corporation loans now are planning to be financed privately. This is taken to indicate growing confidence in the return of prosperity and has drawn private money into the markets to be loaned to go ahead with the work.

The Reconstruction Finance Corporation undoubtedly will make loans contingent upon the requirement that domestic materials be used wherever possible in building projects.

To Speed Up Federal Projects

Further stimulation of large building operations at once was assured by President Hoover last Friday when he announced that he had instructed the various Government departments to speed up Federal construction immediately. The departments were requested to submit estimates of building projects under an appropriation of almost $200,000,000. The President said that Secretary of the Treasury Mills had advised him that the necessary funds are available.

The projects included in the $200,000,000 appropriation embrace construction of public buildings, Army housing, river and harbor work, flood control, work on the Hoover dam, air navigation facilities, construction of lighthouse tenders, engineering work of the Coast and Geodetic Survey and construction at yards and docks of the Navy Department. About one-half of the total will be for public buildings.

Unfilled Orders Gain, Reversing Long Decline

Unfilled orders of the United States Steel Corpn. gained 3293 tons during August. While the amount is small, it is perhaps significant in that it is a reversal of the downward trend of the previous 16 months. The total of the unfilled orders on Aug. 31 was 1,969,595 tons, against 1,966,302 on July 31. On March 31, 1931, the unfilled orders amounted to 3,995,330 tons.

Unfilled orders at the end of each month since 1929 follow:

	1932 Tons	1931 Tons	1930 Tons
January	2,648,150	4,132,351	4,468,710
February	2,545,629	3,965,194	4,479,748
March	2,472,413	3,995,330	4,571,653
April	2,326,926	3,897,729	4,354,220
May	2,177,162	3,620,452	4,059,227
June	2,034,768	3,479,323	3,968,064
July	1,966,302	3,407,816	4,022,055
August	1,969,595	3,169,457	3,580,204
September	.....	3,144,833	3,424,338
October	.....	3,119,432	3,481,763
November	.....	2,933,891	3,639,639
December	.....	2,735,353	3,943,596

... PERSONALS ...

CHARLES T. BIRD, at one time associated with the American Steel Foundries, Alliance, Ohio, and with the Pangborn Corpn., Hagerstown, Md., has been made manager of sales of the sand blast and dust arrester division, American Foundry Equipment Co., Mishawaka, Ind.

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H. H. ELMIRE, who until recently has been in charge of the New York district office at Arlington, N. J., of the Keystone Driller Co., has been promoted to the post of field engineer, with headquarters at the company's home office at Beaver Falls, Pa. JAMES SHEARER, who for a number of years was identified with the Industrial Works, Bay City, Mich., and its successor, the Industrial Brownhoist Corpn., as Chicago district sales manager, has been appointed to succeed Mr. Elmire.

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G. E. TENNEY, formerly sales manager of the Moore Drop Forging Co., Springfield, Mass., has been appointed Chicago district sales manager of the Lincoln Electric Co., Cleveland. The Chicago office is located at 1455 West Thirty-seventh Street.

OBITUARY

M. W. ALEXANDER

MAGNUS W. ALEXANDER, since 1916 president of the National Industrial Conference Board, died of a heart attack at his home in New York on Sept. 10. He was born in New York on Feb. 17, 1870, and studied mechanical, metallurgical and electrical engineering in Austrian universities from 1889 to 1892. The following year he returned to this country and became designer and engineer for the Weston Electrical Instrument Co. In 1894 he joined the Westinghouse Electric & Mfg. Co., with which he remained until 1899. After having spent several months with the Siemens & Halske Electric Co. of America, he became identified with the General Electric Co. in 1900. For 18 years Mr. Alexander was engineer in charge of design for the company, and in 1918 was made engineer on economic issues, in a consulting capacity.

In 1916 Mr. Alexander helped organize the National Industrial Conference Board, of which he was made president and to which he later devoted all of his time, building it up into a unique and useful instrument for the dissemination of statistical and economic facts among American manufacturers.

Mr. Alexander was a past-chairman of the Massachusetts Commission on Old Age, Annuities and Pensions and an ex-member of the Massachusetts Commission on Compensation for Industrial Accidents. He was the author of "Safety in the Foundry" and of many articles on industrial education and economic topics, a number of which appeared in THE IRON AGE.

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JAMES H. PLUMMER, president of the Dominion Steel & Coal Corpn., Toronto, Ont., died at that city on Sept. 11, aged 84 years.

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WILLIAM F. MCKENZIE, who was manager of the sales department of the Buffalo Bolt Co. from 1916 to 1931, died after a long illness at his home in Buffalo on Aug. 25, aged 64 years.

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WILLIAM H. KLEPPINGER, president, Calumet Foundry & Machine Co., Chicago, died suddenly on Sept. 12. He was born at Allentown, Pa., in 1882 and received his schooling at the Hyde Park High School, Chicago. One of his first business connections was as president of the Preble Machine Works, Chicago. He organized in 1916 the Gary Foundry & Machine Co., East Gary, Ind., which in 1919 consolidated with the East Chicago Foundry Co. to form the Calumet Foundry & Machine Co. He was formerly president of the East Chicago Chamber of Commerce.

To Present Survey of Drop Forging Industry

The American Drop Forge Institute will hold its annual meeting at Buffalo on Oct. 4 and 5 in conjunction with the American Society for Steel Treating at the fourteenth National Metal Congress. Featuring a number of interesting discussions will be a presentation of a survey of the drop forge industry by the United States Department of Commerce. C. H. Smith, president of the institute, will speak on the topic "Industry's Challenge to Trade Associations." Other papers are as follows:

Further Experiments on the Forgeability of Steel, by O. W. Ellis, Ontario Research Foundation, Toronto, Ont.

Drop Forge Practice, by Adam Steever, metallurgist, Great Lakes Forge Co., Chicago.

Heating of Steel for Forging, by R. E. Waldron, Dominion Forge & Stamping Co., Walkerville, Ont., and N. L. Deuble, Republic Steel Corpn., Massillon, Ohio.

The Behavior of Steel in Sulphur-Containing Atmospheres at Forging Temperatures, by D. W. Murphy, University of Michigan, Ann Arbor.

National Steel Corpn. Reduces Dividend

Directors of National Steel Corporation have declared a quarterly dividend of 12-1/2c. a share on the capital stock. Previous dividend was 25c. a share.

E. T. Weir, chairman, made the following statement announcing the action of the board:

"The third quarter is the lowest in operations so far experienced by the steel industry, but we are hopeful that the low point has been passed and that we will see a continuing improvement during the fall and winter. Earnings of the company for two months in this quarter are less than at any time so far, but are still on a profitable basis."

Trade Notes

Hobart Brothers Co., Troy, Ohio, electric equipment manufacturer, has appointed Dorsey C. Anderson, 847-C Terminal Commerce Building, 401 North Broad Street, Philadelphia, as central Atlantic distributer for Hobart arc welders.

National Engineering Co., 549 West Washington Boulevard, Chicago, has arranged to have its line of sand mixers, bucket loaders and aerators manufactured in Canada by the Dominion Engineering Works, Ltd., Montreal. The National company's sand handling, sand preparing, mold handling and conveying equipment will be manufactured by the Dominion Bridge Co. and its affiliates for Canadian users.

Murray Iron Works Co., Burlington, Iowa, has appointed S. A. Hadley, 609 Interstate Building, Kansas City, Mo., as sales representative in the Kansas City territory for its boilers, engines, turbines, reduction gears and unit heaters.

Cincinnati Milling Machine Co. and Cincinnati Grinders, Inc., Cincinnati, has removed its Chicago office to 2400 West Madison Street.

St. Louis Gas & Coke Corpn. has moved its offices from St. Louis to the plant at Granite City, Ill. J. L. Reiber is general sales manager.

The evolution in business from barter to modern practices was graphically pictured in THE IRON AGE of June 30 by charts executed by **L. M. Waite, general manager, Higley Machine Co., New York.** These charts are now available in a 48-page pamphlet entitled "You —Me and Business" printed for corporations, associations or individuals who may wish to distribute them on their own account as a help in the thinking that is going on with respect to present-day problems. Mr. Waite's address is 52 Vesey Street, New York.

Production of ball and roller bearings and parts in the United States in 1931, as reported by 53 manufacturers to the Bureau of the Census, amounted to $49,169,653.

Rail Rates to South Atlantic on Iron and Steel Reduced

To Meet Water Competition, Carriers Are Permitted to Lower Tariffs Sharply Over a Wide Area

WASHINGTON, Sept. 12.—Competition between rail and rail-water lines for iron and steel and other traffic has developed lower all-rail rates from Northern points to South Atlantic and Florida ports.

Cuts in rates, sought by carriers serving these ports and their Northern connections, came in the form of a decision announced last Saturday by the Interstate Commerce Commission. By its action, the commission approved application of these lines to establish commodity rates on carload traffic from points in Central and Western Trunk Line territories to the ports without observing the so-called long-and-short haul provision of the interstate commerce act. The commission made a number of provisions. One prevents rates to intermediate points being more than 10 above those applying to the ports. Another provides that the rates shall not apply to any route from points in the interior to the ports which are less than 65 per cent of rates previously approved.

Rates Sharply Reduced

Under the new schedules the all-rail rate on special iron from Youngstown to Savannah, Ga., will be 48.5c. per 100 lb. The present rate is 68c. The rate on cast iron pipe from Pittsburgh to Miami, Fla., will become 47.5c. The present rate is $1. To Tampa, Fla., from Youngstown, the special iron rate will become 68.5c., reduced from 90c.

The new rates will apply from a broad territory, including Ohio and upper Mississippi River crossings; points in Iowa and Missouri taking rates based on the latter crossings north of St. Louis; and points in Minnesota, Wisconsin, Illinois, Indiana, Michigan, Ohio, West Virginia and the Buffalo-Pittsburgh territory in Pennsylvania and New York. The destinations include the South Atlantic ports of Wilmington, N. C., Charleston and Georgetown, S. C., Brunswick and Savannah, Ga., Jacksonville, Fort Lauderdale, Dania, Hollywood, Fernandina, Miami, West Palm Beach and Tampa, Fla., and other points in those States adjacent to the ports. The carriers desire especially to attract traffic, including iron and steel, from points in Michigan, Illinois, Indiana, Ohio, West Virginia, Pennsylvania and New York.

They sought reduced rates over their all-rail routes from the interior to the Southern points to enable them to compete for traffic which is susceptible of movement by water and which now moves in carload lots over the rail-water and rail-water-rail routes through the North Atlantic ports of New York, Philadelphia and Baltimore to the Southern ports and adjacent territory.

The new rates are on the basis of differentials over those charged by carriers forming the rail-water routes beginning with 10c. on first class from the territory indicated as that from which it is hoped chiefly to draw additional traffic.

Champion Rivet Co. to Make Welding Rods

After 40 years of making rivets, the Champion Rivet Co., Cleveland, has expanded its products to include general purpose welding rods. Recognizing the fact that welding has definitely made scientific progress, the Champion company announces this addition to its line to give its customers a complete metal joining service. Several years of experimenting was done before this new line of welding rods was ready for the market.

Farm Equipment Industry Looks for Improvement

CHICAGO, Sept. 9.—"With an upturn of 16 to 75 per cent in the prices of six major farm products over their 1932 low, it begins to look as though the farmer and the farm equipment industry can look for considerable improvement in the near future," Daniel Seltzer, president, National Association of Farm Equipment Manufacturers, said here yesterday.

"While it is too early to attempt to forecast the outlook for 1933, it is apparent that the farmer's position is much better than it was a few weeks ago. Wool prices have advanced 16.3 per cent, wheat 20.8, hogs 45.5, eggs 46.2, cattle 56 and cotton 75. These advances add greatly to the farmer's gross income and their effect, coupled with lower prices for most of the things he buys, will greatly increase his buying power.

"The low price level which has prevailed for the past two or three years has centered the farmer's attention on his production costs. He has learned that economical production is the best method of meeting low selling prices. This has increased his interest in cost-reducing equipment which he undoubtedly will buy as soon as his purchasing ability is reestablished.

"During the past two years the farmer has not been able to purchase equipment as rapidly as his present machines have depreciated. This has resulted in a backlog of orders which should make the business of this industry materially better in 1933, especially if the present upward trend in farm prices continues."

Fluorspar Freight Rates to Be Increased

WASHINGTON, Sept. 12.—Increased ex-river rates on fluorspar, in carloads, from various ports on the Ohio and Monongahela Rivers in Ohio, Pennsylvania and West Virginia to destinations in Ohio, Pennsylvania and West Virginia will go into effect on Friday of the present week. The proposal of railroads to increase the rates was held justified by the Interstate Commerce Commission in a decision made public last Saturday.

The present rates range from 46 to 56 per cent of the sixth-class rates and from 13 to 16 per cent of the first-class rates. The new rates are approximately 75 per cent of the sixth-class rates and 21 per cent of the first-class rates. The railroads said that, based on $20 a ton, the cost of the fluorspar used in the production of steel would amount to only 8c. They estimated that the higher rates will increase the cost of fluorspar at destinations on an average of about 60c. a ton. Accepting these conclusions, the commission declared that it is apparent that the increased cost from the higher rates could not be detected in the price of steel.

The fluorspar moving under the ex-river rates is usually purchased f.o.b. mines in northern Kentucky and southern Illinois, transported in open barges to the river ports where it is unloaded directly from the barges into open-top cars and thence moved by rail to the destinations.

The increases in rates per net ton range from 40c. to 90c. a ton.

A few of the proposed rates are lower than the present rates, this being due to the fact that the present rates are on the full sixth-class basis. For example: the present rate from Monaca, Pa., to Cleveland, is the sixth-class rate of $3.20 and the new rate will be $2.40, or 75 per cent of the sixth-class rate. From Cincinnati to numerous points in Ohio, West Virginia and Pennsylvania, the carriers will cancel their present ex-river rates and apply instead sixth-class rates. For example: the present rates to Youngstown, Wheeling and Pittsburgh of $4.30, $3.80 and $3.80 will become $4.80, $4.60 and $4.80, respectively.

EDITORIAL COMMENT

Railroads Exploit, Steel Makers Conceal, Taxes

INFORMATION was desired as to what taxes the steel producers pay, especially interesting at this time when fixed charges are so large a part of the money turnover. It was found that the steel companies do not report how much taxes they pay, with the exception of the United States Steel Corpn., which reported $33,242,707 for 1931. The usual steel company statement includes taxes with manufacturing cost or lumps them with other special items.

The railroads are continually parading the heavy taxes they pay, ranging between $300,000,000 and $400,000,000 in each of the last 10 years for Class I carriers.

Everybody except the bureaucratic beneficiaries is insisting that taxes are altogether too high, and it is necessary to pull them down. Taxes are a fixed expense and particularly burdensome on the steel industry when it has been producing at only 15 per cent as in the last three months. Taxes must be paid by the steel shipped or come out of surplus. When operation is at 15 per cent instead of 90 per cent, taxes per ton are multiplied by six.

Steel prices are low, all things considered. Taxes are one reason why prices are not lower. The steel companies should show how much tax money they must pay out as a matter of good private as well as public policy.

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Respect the Red Line

FOR some time the automobile industry has been intrigued by the thought that what this country needs is a good $350 car. Several manufacturers have edged to the brink of this low-price market, but have hesitated to make the plunge. It is now evident that no one is likely to.

The reason for this is that motor car makers have awakened to the realization that there are no profits, in fact nothing but losses, in such a venture. After all, there is an irreducible minimum below which a car cannot be built to sell at a profit and still possess the qualities and specifications which the American public demands.

The automobile industry discerns its red border line of price and is astute enough to heed the warning. Is it not time for other members of the metal-working industry to declare an end to the practice of competing on price for the doubtful privilege of dissipating assets?

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Banks Invest In Construction Bonds

IT appears that some of the objectives of the Reconstruction Finance Corporation will be attained without the use of its own funds. The Golden Gate bridge at San Francisco, which will take upward of 100,000 tons of steel, has been financed by bankers, and so has a water works project for Pasadena, Cal., which was to have been one of the first of the authorized projects under the R. F. C. program. Banks have millions of idle funds which they are anxious to put to work, now that the financial scare is apparently over, and private investors seem to be willing to invest their money in bonds for projects that are sound. This is one of the significant signs of returning confidence.

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Large Inventories Out of Date

SOMETIMES we are too prone to attribute small inventories in metal-working plants to parsimonious buying, forgetting that failure to invest huge sums in materials may be due more to good management and an efficient manufacturing system than to a short-sighted policy.

Take, as an illustraton, the automobile industry. Ten years ago it took 30 days to finish a body; today the production of a body starts four days in advance of the shipment of the completed car to the dealer. All-steel bodies, mechanical conveyors and quick-drying finishes have brought with them a speed in manufacture to which we have become so accustomed that we do not appreciate the amazing progress made until we compare today's methods with those of a decade ago.

When we bewail the practice of keeping on hand only skimpy stocks, making due allowance for abnormally slim inventories caused by the depression, we are not giving credit to the changes in materials and processes which have made such stocks feasible. And it is a mistake to cherish the hope that with the return of better times large inventories will come back. The truth is that the machine has so speeded production's wheels that large inventories are as out of date as the horse and buggy.

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Improvement In Massachusetts

INDUSTRIALISTS in central Massachusetts keep particularly close track of their own activity. Practically 100 per cent of the foundry output of the district is reported each month. Records of the industrial payroll, power consumption and the productive hours in 45 leading manfacturing plants are regularly listed.

The Worcester Bank & Trust Co., in a recent review, speaks of a new spirit of confidence in the district. It states that the woolen and worsted mills are increasingly busy at a time of year when a let-down might be expected. Some of the mills are running double time. Certain specialties in the wire industry are in better demand. One of these is armored conduit wire, used by the utility companies. The report states that this increased business may result from a desire to take advantage of the present low price of copper.

Machinery builders in the district report much improved inquiry, and nearly all manufacturers report stocks of raw material low, so that any appreciable increase in orders for manufactured articles would result in considerable buying of the basic materials.

Although it is well to caution against over-enthusiasm and overstocking, nevertheless plants which are fully prepared for new business are apt to be the ones to get the orders, and manufacturers everywhere might profit by the example of some of those in the Worcester district who, by taking advantage of the low price of raw materials, are getting ready to face the conditions ahead.

Steel Ingot Production at New Low Point in August

Daily Rate Drops to 30,830 Tons from 31,701 Tons in July—Output at 14.26 Per Cent of Capacity

STEEL ingot production, on a daily basis, dipped further in August, although the loss was only about 2.7 per cent. For the month as a whole th re was a gain because of two more working days than in July. The full month's output was 832,402 tons of open-hearth and Bessemer ingots, against 792,533 tons in July.

The August daily production represented 14.26 per cent of the American Iron and Steel Institute's estimate of 67,473,630 tons annual capacity for open-hearth and Bessemer ingots. This compares with 14.66 per cent in July.

Output for eight months of this year was 9,192,704 tons, which is less than was produced in the first four months of 1931. Unless there is much more improvement in steel business during the remainder of the year than can now be clearly foreseen, the total for 1932 will not exceed 15,000,000 tons, and may, in fact, fall below that figure. Last year's total for open-hearth and Bessemer ingots was 25,192,715 tons.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS
(Gross Tons)
Reported by Companies Which Made 95.33 Per Cent of 1930 Ingots

1931	Open-Hearth	Bessemer	Calculated Output All Companies: Monthly	Calculated Output All Companies: Daily	No. of Working Days	Per Cent Operation
January	2,098,175	296,620	2,512,140	93,042	27	43.80
February	2,131,079	296,974	2,547,027	106,126	24	49.96
March	2,565,331	346,137	3,054,339	117,475	26	55.30
April	2,321,043	316,668	2,766,959	106,421	26	50.09
May	2,130,805	301,639	2,551,633	98,140	26	46.20
June	1,782,097	246,365	2,127,762	81,837	26	38.52
Six Months	13,028,640	1,804,403	15,559,860	100,386	155	47.25
July	1,574,379	225,030	1,887,580	72,599	26	34.17
August	1,462,254	174,380	1,716,829	66,032	26	31.08
September	1,274,072	199,151	1,545,411	59,439	26	27.98
October	1,319,958	195,943	1,590,180	58,896	27	27.72
November	1,276,856	240,441	1,591,644	63,666	25	29.97
December	1,068,384	172,046	1,301,211	50,047	26	23.56
Total	21,004,543	3,011,394	25,192,715	81,006	311	38.13

The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1930, of 66,068,570 gross tons for Bessemer and open-hearth steel ingots.

Reported for 1932 by Companies Which Made 95.33 Per Cent of 1931 Ingots

1932	Open-Hearth	Bessemer	Calculated Output All Companies: Monthly	Calculated Output All Companies: Daily	No. of Working Days	Per Cent Operation
January	1,230,661	160,633	1,459,450*	56,133*	26	25.96*
February	1,232,568	157,067	1,457,710*	58,308*	25	26.96*
March	1,149,307	193,944	1,409,054*	52,187*	27	24.13*
April	1,036,227	144,197	1,238,250*	47,625*	26	22.02*
May	950,785	103,593	1,106,030*	42,540*	26	19.67*
June	755,122	100,249	897,275	34,511	26	15.96
July	652,650	102,872	792,533	31,701	25	14.66
August	704,747	88,782	832,402	30,830	27	14.26
Eight Months	7,712,068	1,051,337	9,192,704	44,196	208	20.44

*Revised.
The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1931, of 67,473,630 gross tons for Bessemer and open-hearth steel ingots.

August Construction Awards Gained

August contracts for new construction of all descriptions awarded in the 37 States east of the Rocky Mountains showed a gain of 4 per cent over July awards, according to the F. W. Dodge Corpn. The August figure of $133,988,100 compares with $128,768,700 for July and $233,106,100 for August, 1931. Gains over July were shown in building, both residential and non-residential, as well as in engineering works. The contract total for engineering works was only 12 per cent smaller than the total shown for this class of construction during August, 1931.

National Radiator Corpn. Sold by Receiver

Confirmation of receiver's sale of the properties of the National Radiator Corpn., Johnstown, Pa., has been made in United States District Court at Pittsburgh. The properties were sold for $2,550,000 to representatives of a reorganization committee, made up of Rudolph B. Flershem, Charles O. Cornell, Frank B. Cahn and John M. Waters, the latter having been president of the company. He has announced that the name of the company will not be changed and that operations will be continued as before in the company's plants at Johnstown and New Castle, Pa., Dunkirk and North Tonawanda, N. Y., Framingham, Mass., Trenton, N. J. and Chicago.

British Iron and Steel Output Lower in August

LONDON, ENGLAND, Sept. 13 (*By Cable*).—Production of pig and steel ingots in the United Kingdom declined further in August. Pig iron output was 259,400 tons, against 292,600 tons in July, while steel ingot output was 361,500 tons, compared with 430,300 tons in July. Monthly totals for all of 1931 and the eight months of this year follow:

1931	Pig Iron	Steel Ingots
Jan.	337,200	402,200
Feb.	318,200	486,400
March	357,100	500,100
April	323,200	397,400
May	346,500	435,100
June	323,800	428,900
July	317,000	428,700
Aug.	275,700	375,300
Sept.	248,200	400,500
Oct.	284,200	457,400
Nov.	296,400	459,200
Dec.	330,600	422,400
	3,758,100	5,193,600
1932		
Jan.	332,400	429,700
Feb.	318,100	480,600
March	335,600	462,800
April	316,900	433,300
May	315,300	416,900
June	311,400	459,300
July	292,600	430,300
Aug.	259,400	361,500

Government Projects Call for Steel and Zinc

WASHINGTON, Sept. 13.—The Bureau of Supplies and Accounts, Navy Department, has postponed until next Tuesday the opening of bids for 80,000 containers for practice bombing. It is estimated they will require about 500 tons of sheets, chiefly No. 22 gage. The bureau had originally asked for proposals to be opened on Tuesday of last week.

The Edwards Mfg. Co., Cincinnati, was low bidder on 35,000 and the Kittle Mfg. Co., Los Angeles, was low bidder on 50,000 zinc base castings to be used by the navy in practice bombing. The Edwards bid was for supplying the Portsmouth Navy Yard and the Kittle bid was for supplying the Mare Island Yard.

Frederickson & Watson, San Francisco, was the low bidder for the Colusa-Weir project covering work on the Sacramento River for the War Department. The job will require 200 tons of sheet piling. It has been definitely decided that American sheet piling will be used.

SUMMARY OF THE WEEK'S BUSINESS

Steel Ingot Output Still Gaining; Further Betterment Expected

Improvement in Operations at Pittsburgh, Chicago and in the Valleys—Railroad and Automobile Orders May Come Soon

STEEL ingot production this week has risen one point to 15½ per cent of the country's total capacity. Gains have occurred principally in the Pittsburgh, Chicago and Youngstown districts, but these have been offset partly by losses at Cleveland and Buffalo, the latter district being affected by the idleness of one plant which for some time has operated only alternate weeks.

While steel business is improving, the increases thus far in September have not been in proportion to the gain in confidence. Caution still marks most purchases, even to the extent of restricting replenishment of greatly depleted stocks.

The outlook for the remainder of the month is favorable for continued small gains, with the possibility of greater acceleration in October, when orders from the automobile companies for fourth quarter production of new models and from the railroads for an extensive program of car and locomotive repair work will undoubtedly be a more important factor in mill rollings. Progress is being made toward approval of construction projects to be financed by the Reconstruction Finance Corporation, but steel will not be required in most instances for several months.

WHILE it may seem to be far-fetched as a business factor, the result of the Maine election is favorably interpreted in some quarters because of the belief that it will stir the Washington Administration to speed action on building releases and railroad purchases, which have been lagging far behind the time that it was at first thought would be necessary for work to get started. It may be significant that the first R. F. C. loan for construction purposes was nounced late Tuesday—$40,000,000 for a southern California water project to extend from the Colorado River to 13 Pacific Coast cities. Requirements will include 25,000 tons of structural steel, 2000 tons of rails, 30,000 tons of drill steel, several thousand tons of reinforcing bars, 2000 tons of copper cable, 150 electric tunnel locomotives and 800 mine dump cars. Work will be started immediately. The entire project will cost $200,000,000.

The Reading Railroad has let 600 tons of plates for the repair of freight cars and locomotives, and further orders totaling nearly 4000 tons will be awarded this week. This is the first important steel buying for railroad repair programs.

The automobile industry has tentative schedules for the production of 275,000 cars in the fourth quarter, of which General Motors will turn out about 100,000. Steel orders for new models probably will be forthcoming within two or three weeks. Ford production has been resumed gradually since Sept. 6, with present output ranging from 2000 to 2500 cars a day four days a week.

Steel lettings for construction work, mostly small projects, totaled 13,800 tons for the week, with bids requested on 12,300 tons.

Farm equipment manufacturers are preparing for fall manufacturing operations. Resumption of tractor production accounts for a small gain in bar orders at Chicago.

PIG iron purchases have improved at a more noticeable rate than steel buying. Demand for scrap is also increasing moderately, as some steel companies have entered the market in anticipation of enlarged needs. Many of the lesser grades have advanced 50c. to $1 a ton, particularly at Chicago, although other markets also have been affected. Heavy melting steel has gained only at Pittsburgh, but this brings THE IRON AGE composite price for that grade up to $7.67, against $7.58 last week. The high for the year was $8.50, in January. The speculative character of scrap markets is illustrated by the fact that Pittsburgh dealers are offering more for heavy melting steel than mills have paid.

Some makers of bars, shapes and plates have reaffirmed the present quotation of 1.60c. a lb., Pittsburgh, on these products. Current prices on alloy steel bars will also be continued into the next quarter, as will those on hot-rolled strip, wire products and bolts, nuts and rivets. Sheet makers are endeavoring to wipe out recent concessions of about $2 a ton, having announced for fourth quarter the prices that were in effect at the beginning of the third quarter, but which declined in August. The fact that a few mills are willing to book business during the remainder of the quarter at the lower prices will postpone the test of the advanced quotations. Automobile body sheets may remain at 2.75c. a lb.

STEEL ingot output in August dropped to a new low rate of 30,830 tons a day, against 31,701 tons in July. The total for last month was higher at 832,402 tons because of two more working days than in July, when the full month's output was 792,533 tons. The percentage rate for the month was 14.26, against 14.66 in July.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	Sept. 13, 1932	Sept. 6, 1932	Aug. 16, 1932	Sept. 15, 1931
Per Gross Ton:				
No. 2 fdy., Philadelphia	$13.84	$13.84	$13.84	$16.26
No. 2, Valley furnace	14.50	14.50	14.50	17.00
No. 2 Southern, Cinti	13.82	13.82	13.82	14.69
No. 2, Birmingham	11.00	11.00	11.00	12.00
No. 2 foundry, Chicago*	15.50	15.50	15.50	17.50
Basic, del'd eastern Pa	13.50	13.50	14.00	16.75
Basic, Valley furnace	13.50	13.50	13.50	15.50
Valley Bessemer, del'd P'gh	16.89	16.89	16.89	18.76
Malleable, Chicago*	15.50	15.50	15.50	17.50
Malleable, Valley	14.50	14.50	14.50	17.00
L. S. charcoal, Chicago	23.17	23.17	23.17	25.04
Ferromanganese, scab'd carlots	68.00	68.00	68.00	85.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	32.00	32.00	32.00	34.00
Rerolling billets, Pittsburgh	26.00	26.00	26.00	29.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	29.00
Slabs, Pittsburgh	26.00	26.00	26.00	29.00
Forging billets, Pittsburgh	33.00	33.00	33.00	35.00
Wire rods, Pittsburgh	37.00	37.00	37.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb	1.60	1.60	1.60	1.60

Finished Steel

	Cents	Cents	Cents	Cents
Per Lb. to Large Buyers:				
Bars, Pittsburgh	1.60	1.60	1.60	1.60
Bars, Chicago	1.70	1.70	1.70	1.70
Bars, Cleveland	1.65	1.65	1.65	1.65
Bars, New York	1.95	1.95	1.95	1.93
Tank plates, Pittsburgh	1.60	1.60	1.60	1.60
Tank plates, Chicago	1.70	1.70	1.70	1.70
Tank plates, New York	1.898	1.898	1.898	1.88
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.60
Structural shapes, Chicago	1.70	1.70	1.70	1.70
Structural shapes, New York	1.86775	1.86775	1.86775	1.855
Cold-finished bars, Pittsburgh	1.70	1.70	1.70	2.10
Hot-rolled strips, Pittsburgh	1.45	1.45	1.45	1.55
Cold-rolled strips, Pittsburgh	1.90	2.00	2.00	2.15

Finished Steel

	Sept. 13, 1932	Sept. 6, 1932	Aug. 16, 1932	Sept. 15, 1931
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.10	2.10	2.20	2.40
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.20	2.20	2.30	2.50
Sheets, galv., No. 24, P'gh	2.75	2.75	2.85	2.90
Sheets, galv., No. 24, Chicago dist. mill	2.85	2.85	2.95	3.00
Hot-rolled sheets, No. 10, P'gh	1.55	1.55	1.55	1.70
Hot-rolled sheets, No. 10, Chicago dist. mill	1.65	1.65	1.65	1.80
Wire nails, Pittsburgh	1.95	1.95	1.95	1.90
Wire nails, Chicago dist. mill	2.00	2.00	2.00	1.95
Plain wire, Pittsburgh	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.25
Barbed wire, galv., Pittsburgh	2.60	2.60	2.60	2.55
Barbed wire, galv., Chicago dist. mill	2.65	2.65	2.65	2.60
Tin plate, 100 lb. box, P'gh	$4.75	$4.75	$4.75	$5.00

Old Material

Per Gross Ton:				
Heavy melting steel, P'gh	**$9.50**	$9.25	$8.50	$10.75
Heavy melting steel, Phila	7.25	7.25	6.50	8.50
Heavy melting steel, Ch'go	6.25	6.25	5.75	8.25
Carwheels, Chicago	7.00	7.00	6.00	9.50
Carwheels, Philadelphia	**9.50**	8.50	8.50	12.00
No. 1 cast, Pittsburgh	10.00	10.00	9.50	10.50
No. 1 cast, Philadelphia	**9.50**	8.50	8.00	11.50
No. 1 cast, Ch'go (net ton)	6.25	6.25	6.00	8.50
No. 1 RR. wrot., Phila	7.50	7.50	8.50	10.00
No. 1 RR. wrot., Ch'go (net)	5.00	5.00	3.75	7.00

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$2.00	$2.00	$2.00	$2.40
Foundry coke, prompt	2.75	2.75	3.00	3.50

Metals

	Cents	Cents	Cents	Cents
Per Lb. to Large Buyers:				
Lake copper, New York	**6.37½**	6.12½	5.50	7.62½
Electrolytic copper, refinery	**6.00**	5.75	5.12½	7.00
Tin (Straits), New York	24.50	25.50	23.30	25.45
Zinc, East St. Louis	**3.45**	3.37½	2.75	3.75
Zinc, New York	**3.82**	3.74½	3.12	4.10
Lead, St. Louis	3.45	3.45	3.05	4.22½
Lead, New York	3.60	3.60	3.20	4.40
Antimony (Asiatic), N. Y	**5.75**	5.50	5.00	6.60

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

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▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
Sept. 13, 1932	1.965c. a Lb.	$13.64 a Gross Ton	$7.67 a Gross Ton
One week ago	1.965c.	13.64	7.58
One month ago	1.976c.	13.64	6.92
One year ago	2.014c.	15.42	9.17
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1932	1.976c., June 28	1.926c., Feb. 2	$14.81, Jan. 5	$13.64, Aug. 16	$8.50, Jan. 12	$6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Pittsburgh District Output Up to 14 Per Cent; Valley Ingot Rate Also Gains

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PITTSBURGH, Sept. 13.—Further limited gains in orders for finished steel products during the last week have strengthened the conviction that the industry is entering a period of improvement, but that recovery may be developed very slowly. The major consuming industries are not yet placing tonnage orders, and the small needs of jobbers and miscellaneous manufacturers have accounted for practically all the improvement to date. It is now believed the shipments to the automobile industry will show no definite gain before October, and continued delay in structural steel releases and orders by the railroads would indicate that it will be next month before any important tonnage from these sources reaches mills. As a result, the remainder of this month cannot be counted upon to bring more than very moderate gains in steel output.

Steel ingot production in the immediate Pittsburgh district is estimated at 14 per cent this week, while Valley and Northern Ohio schedules are higher at 15 per cent. Wheeling district production continues at about 25 per cent of capacity. At practically all plants previous gains in operation have been held and improvement seems fundamentally justified. Finishing mill schedules are up slightly in some departments, with tin plate alone showing any loss.

Finished steel prices are fairly well maintained, and current quotations have been reaffirmed for fourth quarter on practically all products. Application of quantity differentials on bars, plates and shapes is being considered by the mills in an effort to forestall heavy losses which are being sustained on current small orders. Sheet prices are being clarified, as open reductions have occurred on auto body material, while the common finishes which have been weaker are being strengthened. Hot-rolled strip is well maintained, but cold-rolled strip has developed rather definite weakness.

The scrap market continues strong in spite of the fact that mill purchases have been made at levels somewhat under the expectations of dealers.

Ingot production in Pittsburgh area has risen to 14 per cent, as compared with 12 per cent a week ago. Valley rate has advanced from 12 to 15 per cent, but the Wheeling average remains at 25 per cent.

* * *

Conviction is strengthened that industry is entering a period of improvement, though recovery may be slow.

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Miscellaneous demands have accounted for most of the betterment to date.

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Heavy melting scrap is stronger, averaging 25c. a ton higher than a week ago.

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Pig Iron

Some sellers report a slight improvement in small orders for immediate shipment, but aggregate sales in this district and the Valleys have shown only a small gain over August. Prices seem to be well maintained, and consumers are following their former policy of buying only for immediate needs. No large new inquiries are before the trade, and expectations of heavy purchases are not very bright. The local merchant stack has resumed production, and a merchant furnace in the Valleys is scheduled to go into blast early next week. An independent steel company stack in the Pittsburgh district has also resumed production.

Semi-Finished Steel

Makers have reaffirmed the current price of $26, Pittsburgh or Youngstown, for fourth quarter business. No new contracting is reported, as requirements of non-integrated rolling mills are currently very light. Wire rods will be continued at $37, and forging billets at $33.

Rails and Track Accessories

Reports of contemplated rail purchases continue, but no inquiry has appeared. There have been a few small rail releases on old contracts which will enable the local mill to resume soon on a limited run.

Bolts, Nuts and Rivets

Demand seems to be improving over August levels, but is so light that makers have not been able to increase production schedules. The current price of $2.25 a 100 lb. on rivets has been reaffirmed for third quarter, and recent discounts on bolts and nuts and small rivets are not expected to be changed.

Bars, Plates and Shapes

State and Federal projects are still taking a fair tonnage of structural steel and reinforcing bars. Inquiry seems to be running slightly ahead of awards, indicating a fairly substantial volume of business in the next month or two. Releases on old structural contracts are coming to mills at a fair rate, and September will probably exceed August in shipments. State highway lettings in Pennsylvania call for a considerable tonnage of reinforcing steel and road mesh. A sewer job at Louisville, Ky., will take 3300 tons of bars, and a high school in the same city will require 900 tons. Releases for merchant bars have shown a limited though steady improvement since the first of the month. Mill operations are slightly heavier, principally because of the larger number of orders rather than their size. Plates are still quiet. Recent developments in the oil fields indicate a heavier demand for tankage steel, but the tendency of the oil producers to utilize existing facilities may forestall purchases this year. The Reading is the only railroad which has yet issued definite inquiries for car repair steel. The Pennsylvania may be given a reply this week to its request for a Government loan to finance the building of 1500 box cars.

Prices on bars, plates and shapes will be reaffirmed for fourth quarter, although steel companies have had few requests for quotations on future business. The current market is holding very well on all three products.

Cold-Finished Steel Bars

Specifications this month are running about 10 per cent ahead of those of August with some producers. This represents a very minor gain in tonnage, but is considered hopeful. The price is well maintained, and the new system of differentials to large buyers announced last week has met with favorable response.

Tubular Goods

Pipe business continues dull in all departments. A belief that the oil industry might be a substantial buyer during the fall is gradually disappearing, even though stocks of tubular

goods in the oil fields are exceptionally light. Warehouses at Mississippi River points seem to be able to take care of rush orders adequately. Standard pipe may show some improvement in the next month or two, but demand has not yet gained over low summer levels.

Wire Products

Substantial seasonal improvement in the wire business is still deferred. Movement of fencing and barbed wire to the agricultural districts of the South and West seems to be a little heavier, but manufacturers' wire continues very dull, and jobbers show no disposition to add to their stocks of nails. Makers have opened their books for fourth quarter, with no change in the current prices of $1.95 a keg for nails and 2.20c. for plain wire. Special dating terms on woven wire fencing have been announced.

Sheets

Demand for sheet steel products has experienced limited gains in the last week, but tonnage has been widely distributed in the form of small orders, mostly for immediate delivery. The automobile industry has contributed practically nothing to the increase. Jobbers have been more active and roofing tonnage is moving in better volume. Manufacturing consumers are buying very sparingly. Mills ran at about 16 per cent of capacity last week and may average 17 per cent in the current period.

Prices are gaining strength and galvanized and hot-rolled annealed sheets are again quotable at 2.85c. and 2.20c., Pittsburgh, respectively. Automobile body sheets are quotable at 2.75c., Pittsburgh, for the fourth quarter and light cold-rolled at the usual $3 differential. No other changes have been made.

Tin Plate

Business is seasonably quiet, but mill schedules have not declined very much and average between 30 and 35 per cent. One or two large makers are turning out considerably more material than they are shipping, but the leading interest will not begin to roll anticipated tonnage as early as usual this year.

Coke and Coal

Improved demand from the foundries is slow to make itself felt, but most of them have increased their schedules. Furnace coke continues very quiet, although furnace operations are higher. Another merchant stack will blow in this month. Domestic demand has not yet appeared.

Strip Steel

Specifications show very little improvement, as the automobile industry is not releasing much tonnage. Demand from other sources is slow to improve. Hot-rolled strip is well maintained at 1.45c. to 1.50c., Pittsburgh, but concessions of $2 a ton have become rather common on cold rolled. While the 1.90c. price is confined to fairly large buyers, it must be quoted to represent the market clearly. Fender stock has been reduced to 2.75c., Pittsburgh.

Scrap

Mill purchases of No. 1 heavy melting steel during the last week at $9.35 and $9.50 have brought about an interesting situation in view of the fact that the dealers' market is higher than the consumers'. While tonnages taken by mills have not been large, they indicate that dealers are still more interested in orders than in profits. The heavy melting steel on the monthly list of the Pennsylvania Railroad is reported to have brought well over $10, and as high as $10.50 is said to have been paid in outside districts for shipment to a consuming point in the Pittsburgh district. Hydraulic compressed sheets are also stronger, with sales to dealers at as high as $9.75 reported. Blast furnace scrap has been sold at $6, but the market is strong enough to justify continuance of recent quotations. Scrap is just as hard to pick up as it has been, but steel ingot operations have not improved sufficiently to require very heavy shipments.

European Iron and Steel Trade Gaining in Orders and Confidence

LONDON, England, Sept. 12 (*By Cable*).—An increasing number of inquiries for iron and steel suggests that the worst of the depression may be over. General business is still very slow, although consumers at home and abroad are more inclined to consider forward negotiations.

Tin plate demand is steadily improving. Up to 16s. base, f.o.b. works port, has been paid. Output is around 60 per cent. Activity in galvanized sheets is increasing

Continental steel is firm, works having secured fair overseas orders.

United Kingdom exports of pig iron in August were 6,300 tons, of which 40 tons went to the United States. Total exports of all kinds of iron and steel last month were 156,000 tons.

The Soviet Government has placed orders, having a value of 200,000 gold pounds, for Austrian steel and machinery.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9 0s.	
Billets, open-hearth	4 17 6d	to £5 7s. 6d
Black sheets, Japanese specifications	9 12 6	
Tin plate, per base box	15 9	to 16
Steel bars, open-hearth	7 17½	to 8 7½
Beams, open-hearth	7 7½	to 7 17½
Channels, open-hearth	7 12½	to 8 2½
Angles, open-hearth	7 7½	to 7 17½
Black sheets, No. 24 gage	8 0	to 8 10
Galvanized sheets, No. 24 gage	9 10	

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £ at $4.86

Billets, Thomas	£1 18s. 6d	
Wire rods, No. 5 B.W.G.	4 10	
Black sheets, No. 31 gage, Japanese	11 5	
Steel bars, merchant	2 7 6	
Beams, Thomas	2 2 6	
Angles, Thomas, 4-in. and larger	2 6 6	
Angles, small	2 8 6	
Hoops and strip steel over 6 in. base	3 0	to £3 2s. 6d
Wire, plain, No. 8	5 7½	
Wire, barbed, 4-pt., No. 10 B.W.G.	8 15	

Detroit Scrap Prices Advance 25c. to 50c.

DETROIT, Sept. 13.—Efforts of scrap dealers to cover short sales, together with the small amount of scrap coming into the market, have forced prices on almost all items up 25c. to 50c. a ton. Heavy melting steel has advanced 25c. a ton and bids of $6.50 have been made for desirable tonnages. Hydraulic bundles show the sharpest increase, being 75c. a ton higher than they were a week ago. Short turnings in some cases are bringing $3.50 a ton. These prices reflect the bullishness of dealers and their inability to get scrap rather than consumer buying, which continues light.

Pacific Coast Awards of Steel Show Gain

SAN FRANCISCO, Sept. 12.—The Labor Day holiday and California's additional Admission Day holiday on Friday of last week tended to disrupt manufacturing as well as sales activity. Nevertheless, the awards for the week were greater in volume than for many weeks past. Well over 3000 tons was placed on major contracts, and new inquiries and newly reported pending tonnage for structural shapes and reinforcing bars total the same figure.

Chicago Ingot Rate Advances to 13 Per Cent; Specifications Increasing

CHICAGO, Sept. 13.—Steel works output has risen at least one point to 13 per cent of capacity, and new inquiries and specifications point to a continuance of this rate. Betterment comes from a broad field, excluding plate users and the railroads. Among encouraging signs is improved demand for wire and warehouse steel. The upward trend in wire orders is unchecked, with September showing a material gain over August. Warehouse business is also showing a normal seasonal trend, with incoming orders growing not so much in number as in size. Specifications for structural material have increased for two consecutive weeks and public work is taking on added life.

Prices are stronger on small lots of cast iron pipe and on most forms of wire products. Plates, shapes and bars remain at 1.70c. a lb. Sentiment in the scrap market is less bullish, though prices for specialties are gradually working higher.

Pig Iron

A moderate buying movement is under way and prices are steady at $15.50 a ton, Chicago furnace. Some attractive tonnages have been placed for fourth quarter and shipments show up well as compared with August. Increased melt is no longer limited to small units. Larger foundries are increasing operations. A wheel foundry has placed a round tonnage of silvery. The Federal barge line is publishing a new rail and barge rate of $5.51 from Birmingham. Southern iron will move to Memphis by rail, then by barge to Peoria and then to destination by rail.

Bolts, Nuts and Rivets

Demand remains sluggish and inquiry does not point to a change. Fourth quarter contracting is well under way.

Wire Products

August shipments gained nearly 12 per cent over those of July, and the September increase, as compared with July, is 18 per cent, so it is quite evident that a true seasonal upswing in demand is here. So far, most of this improvement has come from rural districts, but sellers look for tonnages from automobile manufacturers before the end of this month and they expect agricultural implement production to bring orders to books some time in October. Use of copper wire, though moderately improved, is lagging because public utilities find present facilities far in excess of needs. Mills are confirming present quotations for fourth quarter. Pressure against the price structure is less acute.

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Steel bookings are better from all sources except plate fabricators and the railroads.

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Gains in wire business and warehouse demand are fully up to seasonal expectations.

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Increased melt of pig iron is no longer limited to small foundries. Larger castings manufacturers are now increasing operations.

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The upward trend in scrap prices continues, although heavy melting steel prices are unchanged.

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Warehousing Business

Shipments so far this month are well ahead of the August average, and of still greater significance is the fact that the number of orders is not materially larger, but individual orders are heavier. It is also worthy of note that many old accounts, long dormant, are again entering warehouse books.

Cold-Rolled Strips

Output ranges from 9 to 10 per cent, with little chance for improvement until later in the month, when new automobile models will call for more steel.

Hot-Rolled Strip

A frame maker's order for 1000 tons stands out in a market that is extremely dull. Price announcements for fourth quarter are still withheld.

Cast Iron Pipe

The Sanitary District, Chicago, is attempting to obtain $36,000,000 from Federal Government funds in order to carry forward its plans for sewage treatment plants. This work, should it get under way, will give substantial support to the cast iron pipe market. Wilmette, Ill., with a water plant project calling for 800 tons of pipe, is also trying to get financial assistance. Small inquiries for pipe are gaining in number, and prices for carloads and less are stronger.

Rails and Track Supplies

It is understood that railroads are making satisfactory progress with budgets, but there is no intimation as yet concerning rail tonnages that may be bought. Some mills are still holding tonnage on books. The light rail market continues to gain momentum, as do spikes and bolts for mine track work.

Structural Material

The upturn in specifications, noted a week ago, is still in evidence, the average now being well above anything that mills have experienced in the last two months. Bids have been rejected on the 1800-ton Ottawa, Ill., bridge. A bridge calling for 1000 tons is up for bids at Joliet, Ill., and bids will also be taken there in the near future on a similar structure.

Plates

The Rock Island plans to open its Silvis, Ill., shops about the middle of the month. Although railroad shop work is more active, little tonnage is coming from that source. The Pacific Fruit Express will build 240 underframes in its own shops.

Bars

Orders for steel bars indicate that tractor production is gaining moderately. Manufacturers of farm implements report that stocks are well liquidated and they are preparing to resume output on a small scale. Use of rail steel bars is gaining, and mill schedules are considerably improved.

Reinforcing Bars

Prices are again turning lower, this being especially noticeable in rail steel bars used in road and bridge work. The rail steel commodity has dipped as low as 1.30c. a lb. in some cases. Low general contract bidders have been announced on l rge tonnages of Illinois road work. It may be several weeks before the necessary steel is ordered.

Scrap

Some specialties remain scarce, and purchases of small lots readily bring higher prices. The heavy melting steel market is quiet, following a small-lot sale at $6 a ton, delivered. Railroads continue to get top prices for most of the grades they sell. For instance, the heavy melting steel disposed of by them usually brings the equivalent of about $7 a ton, delivered consumers' yards. The Chicago & Alton and the Pere Marquette are offering lists.

Eastern Pennsylvania Trade Expects Upturn Late This Month

Reading Railroad Places 600 Tons of Plates for Car Repairs—Will Buy Additional Tonnage Soon

PHILADELPHIA, Sept. 13.—While there has been no noticeable increase in inquiries and orders for steel, the trade continues to be hopeful for a fair upturn before the end of the current month. Movements looking to increased railroad buying and Federal construction are the chief factors which lend a better tone to the market.

In anticipation of improvement, mills are buying scrap more actively. The market for old material has accordingly reflected greater strength. A number of grades have risen from 50c. to $1. In view of the scarcity of many grades, the market is particularly sensitive to demand.

The Reading Railroad has begun to distribute steel orders in connection with its program to repair 3700 cars and 78 locomotives. The car repairs will require 3600 tons of plates, of which 600 tons was placed with a Coatesville, Pa., mill. The locomotives will call for about 320 tons of fire box plates.

Operations have increased to about 12 per cent from 11 per cent and will be raised to 13 per cent before the end of the week, when additional open-hearth capacity will be placed in operation.

Pig Iron

Bookings have increased the past week. The largest order reported was for 500 tons of No. 2X, which went to a melter in this district. Another nearby consumer took 250 tons of No. 3. Stove makers are buying somewhat more freely to meet seasonal increases in requirements.

Plates, Shapes and Bars

Some makers have reaffirmed third quarter prices for the final quarter, with plates at 1.70c., Coatesville, and shapes and bars at 1.60c., Pittsburgh. While the market is said to be generally firm, it is reported that the plate price has been shaded somewhat.

Sheets

Mills have announced fourth quarter prices at the regular levels previously prevailing. Lower quotations have been withdrawn and are said now to apply only on old contracts. Manufacturers say strong effort will be made to resist a breakdown in prices such as became noticeable on several grades in August. Weakness was especially marked in galvanized and hot-rolled annealed sheets. Demand is light. Despite forthcoming new models, the automotive requirements coming to this district are extremely small.

Scrap

Further strength has developed in the market for old material. Advances of 50c. to $1 a ton have been made the past week as the result of more active buying and the scarcity of scrap. A great deal of the buying is due to anticipation by steel works of a rise in demand for steel. Fair-sized lots of couplers and knuckles, rolled steel wheels, cast iron carwheels and No. 1 heavy breakable cast have been sold at increased prices. A sale of low phosphorus scrap by one mill to another mill has also strengthened the market for that grade. While one small sale of rolled steel wheels is reported to have been made at more than $10, delivered, another sale of a fair-sized lot of this material went to a nearby mill at $10, delivered.

Imports

Imports at Philadelphia last week consisted of 4000 tons of chrome ore from Turkey, 6 tons of steel bands and 2 tons of steel bars from Belgium and 6 tons of galvanized steel strips from England.

Valley Steel Trade Experiences a Moderate Improvement

YOUNGSTOWN, Sept. 13.—The first full week of the new month brought moderate improvement in orders for finished steel products received by Valley mills. However, the aggregate increase in tonnage was not especially significant. Small miscellaneous consumers are placing the bulk of current orders. Specifications from the automobile industry continue light. Fabricators of finished steel products in the Youngstown district reported improved business, but their tonnage is not yet reaching the steel mills.

Under the circumstances, steel production in the Valleys has not risen much on the average, although the schedules of a leading producer last week were high enough to raise production considerably over the August level. Independent steel producers in the Valleys and northeastern Ohio are still having rather spotty operations. Finishing mill schedules are also uncertain and vary sharply from week to week. Some of the larger bar mills were able to run several more turns than usual last week on accumulated orders, but will probably make up for this in the current week. Sheet and strip production is very intermittent, and pipe mills scarcely average two turns a week.

Current prices on finished steel products made by Valley mills are generally being reaffirmed for fourth quarter. On sheets, this represents an advance over recent selling levels, although asking prices are the same as they have been. Producers are encouraged by recent strengthening of sheet prices, following several weeks of rather frequent cutting. Hot-rolled annealed sheets are now being held at 2.20c., Pittsburgh, to all classes of buyers except automobile and steel barrel manufacturers, who previously enjoyed a $2 differential. Galvanized sheets are maintained at 2.85c., Pittsburgh, and heavy and light cold-rolled at 2.25c. and 2.75., respectively. The fourth quarter price on auto body sheets has not been established by significant purchases. Hot-rolled strip is well maintained at 1.45c. to 1.50c., and cold-rolled strip at 2c., Pittsburgh.

The market on raw materials has shown a little improvement, but steel companies are not yet disposed to place sizable orders for the future. Pig iron is very dull and recent scrap purchases have not been heavy, even though the price has risen rather sharply. Although the last sale of No. 1 heavy melting steel in the district was made at $9.75, dealers are no longer willing to sell at this level, and further buying might advance the market.

Cincinnati Pig Iron Sales Make a Gain

CINCINNATI, Sept. 13.—Demand for pig iron gained the past week, furnace representatives reporting sales of slightly more than 1000 tons. This business was from scattered sources and represents urgent needs of a number of melters. An order from an Indiana consumer for 150 tons of Southern iron was the only business approaching substantial proportions. Inquiries have also increased.

Scrap

Small increases in dealers' bids the past week failed to attract material. While some mills indicate a desire to buy, dealers are unable to cover at prices which will produce a profit.

Cleveland Steel Production Now 23 Per Cent of Capacity

Miscellaneous Orders for Bars and Strip Have Gained, Although Total Steel Bookings Show Little Change

CLEVELAND, Sept. 13.—There is little change in the volume of business in finished steel, although miscellaneous orders for bars and hot-rolled strip gained slightly with some producers during the week. Business from the motor car industry is still scarce, and the belief is rather general that several of the automobile manufacturers will delay the bringing out of new models until near the end of the year. Operations among plants outside of the automotive field show little change and these are ordering steel only as needed. Demand from railroads continues very light.

Steel ingot output in Cleveland this week is 23 per cent of capacity. The Corrigan, McKinney Steel Co. has shut down one furnace, now operating three.

One Ohio maker has reaffirmed the 1.65c., Cleveland, price for steel bars for the fourth quarter. Some of the other mills expect to reestablish this price later in the week and to reaffirm the 1.60c., Pittsburgh, price for plates and shapes. Present prices on alloy steel bars have been reaffirmed for the coming quarter. A few makers have announced the reestablishment of third quarter prices for sheets which are $2 a ton higher on most grades than the ruling minimum quotations. However, orders can be booked through September at the lower prices for delivery through October, and it may take several weeks to determine whether efforts to put prices on a higher basis succeed. The market lacks firmness, and concessions on other grades have extended to enameling sheets. Present prices on hot-rolled strip have been reaffirmed, as well as the 2c. price on cold-rolled strip, which is being shaded. Third quarter prices for wire products and bolts, nuts and rivets have also been reaffirmed.

Steel-making scrap prices have been marked up 50c. a ton.

Pig Iron

While activity has declined both in sales and inquiry, Cleveland interests sold 7500 tons of foundry and malleable iron during the week for delivery over the remainder of the quarter. The orders were mostly for small lots, although there was one sale of 1000 tons. The business was well scattered, coming from the oil well, electrical and other industries, but very little from motor car foundries. Some malleable iron was bought by jobbing foundries. Shipments show considerable gain over those of August. Operations of some foundries of products manufacturers have increased, but business with jobbing foundries is still very slack. Prices are steady.

Iron Ore

Receipts at Lake Erie ports during August were 619,342 tons, which was a little gain over July. Receipts at these ports for the season to Sept. 1 were 1,245,280 tons, against 9,397,352 tons during the corresponding period last year. Shipments from Lake Erie docks last month were 516,315 tons and for the season to Sept. 1 were 1,479,770 tons, against 7,578,943 tons for the same period last year. Receipts at other than Lake Erie ports last month were 87,508 tons. Ore on Lake Erie docks Sept. 1 was 5,267,689 tons, against 5,685,751 tons on the same date a year ago.

Strip Steel

There is some gain in the demand for hot-rolled strip. Small lots were released during the week by makers of automobile accessories and some business came from manufacturers of builders' hardware. A few of the mills have reaffirmed for the coming quarter the present prices of 1.45c. to 1.50c., Pittsburgh, for hot-rolled strip; 2c., Cleveland, for cold-rolled strip, and 2.90c. for fender stock.

Sheets

Efforts are being made to get the sheet market back to a firmer basis, and some of the mills have formally announced the reaffirmation for the fourth quarter of the prices that were named for this quarter, but from which there has been a shading of $2 a ton on most grades. These prices, if effective, will restore quotations to 2.20c. on black, 2.25c. on heavy cold-rolled, 2.75c. on light cold-rolled, 2.85c. on galvanized and 2.90c. on auto body. Current business is being taken at the concessions recently prevailing, and one producer will take orders at these prices through this month for shipment until Oct. 31. Weakness has developed on enameling stock with quotations of 3c. on No. 20. Demand from stove manufacturers for enameling sheets has improved. Otherwise the market shows little change.

Bolts, Nuts and Rivets

Present prices have been reestablished for the fourth quarter at 75 per cent off list for bolts and nuts, $2.25 per 100 lb., Cleveland and Pittsburgh, for large rivets and 70, 10 and 5 per cent discount for small rivets. Stove bolts are unchanged. Bolt orders have increased slightly. Jobbers are buying more freely and a little business is coming from the railroads. Demand for rivets also has improved.

Fluorspar

The market has declined $2 a ton, a few car lot sales of gravel fluorspar having been made at $10, mines.

Bars, Plates and Shapes

An Ohio plant having a Hoover dam pipe contract is inquiring for 800 tons of steel for a temporary building for that project. Bids for the Cincinnati post office, requiring 5000 tons, will go in Thursday and plans for the Cleveland post office, taking approximately 9000 tons, are expected out about Oct. 1. Inquiry for fabricated work in this territory is limited to small lots. A Louisville, Ky., sewer will take 3000 tons of reinforcing bars.

Scrap

The market has a very firm tone and steel-making grades have advanced 50c. a ton, although no new purchases were made by consumers during the week.

Railroad Equipment

Soviet Union is inquiring for 36 locomotives, including seven 0-10-0 type, five 0-8-0 type, 20 0-6-0 type and four 0-4-0 type.

Monsanto Chemical Works is inquiring for six 7000-gal. tank cars.

Reading Co. will start soon on heavy repairs to 3000 cars and light repairs to 800 cars.

Cast Iron Pipe

Department of Public Works, Buffalo, asks bids until Sept. 19 for cast iron pipe and specials for municipal water system.

Ottumwa, Iowa, has placed 100 tons for a filter plant with American Cast Iron Pipe Co.

Cloverdale, Ind., has taken prices on 200 tons; contract to be closed in about two weeks.

Portland, Ore., opens bids Sept. 16 for about 200 tons of 30-in., class B.

Deer Lodge, Mont., opened bids for approximately 1000 tons of 2- to 16-in. Lease & Leigh Land Co., Great Falls, low bidder on general contract alternate for pre-caulked cast iron.

Construction Quartermaster, Benton Field Army Air Depot, has called for bids on Sept. 28 for a water system requiring 100 tons of 6- and 8-in.

Canal Zone has awarded 200 tons of 6-in. to American Cast Iron Pipe Co.

Railroad Bridge Project to Take 950 Tons

WASHINGTON, Sept. 13.—About 950 tons of structural steel will be required for bridges in connection with the construction of the Dotsero cutoff of the Denver & Rio Grande Western Railroad, for which the Interstate Commerce Commission yesterday approved an application for a Reconstruction Finance Corporation loan of $3,500,000. The work will also call for a small tonnage of pipe, rails and track material.

New York Steel Sales Show Only Small Increase

Trend Is Toward Improvement, but the Rate of Gain Is Slow and Has Not Affected All Products

NEW YORK, Sept. 13.—Minor increases in sales, principally in the lighter products, have made the past week a better one in finished steel. Most all of the improvement is in sheets and tin plate, although there has been a little in bars. Heavier tin plate specifications generally represent a clean-up of 1932 contracts by some large users, and orders for this product will now taper off more sharply. In the heavier products—rails, plates and shapes in particular—there is virtually no gain.

Makers of sheets have quite generally announced fourth quarter prices identical with those named for the third quarter, which were shaded on most grades about $2 a ton during August. Some mills are still taking current business at the reduced levels, and the higher prices will not be effective on much tonnage until the beginning of the fourth quarter. There have been very few requests for fourth quarter quotations on bars, shapes and plates, but the indications are that the present quotations will be continued into that period.

Pig Iron

Open inquiry involves several small lots for quick shipments. Sellers, however, report a number of tentative inquiries involving about 2000 tons. Current interest in pig iron does not extend beyond December, though a few contracts have recently been closed for delivery into first quarter. Most furnace interests, however, are not pressing to sell for extended shipment. Sales of 3000 tons in the past week approximated those in the preceding week and compare with 6000 tons two weeks ago. The Malleable Iron Fittings Co., Branford, Conn., has purchased against its recent inquiry for malleable iron. Prices are being generally held to schedule on normal lots, with recent bookings fairly well distributed among various furnace districts.

Reinforcing Bars

Specifications are out for about 800 tons of bars for highway construction, route 2, section 9, at Suffern, N. Y. Other fresh projects are of a minor character. Recent awards include about 2000 tons of mesh for several New York State highway projects to American Steel & Wire Co., and 425 tons of bars for State hospital buildings at Thiells, N. Y., to Concrete Steel Co. Prices are being well maintained at 1.75c., Pittsburgh, and 2.10c., New York.

Scrap

Consumer demand is slightly better, though important buying into consumption is still absent. Prices are apparently holding recent gains. Demand for No. 2 heavy melting steel has forced the price to $3.50 a ton, on barge.

Birmingham Pig Iron Shipments Gain Slightly

BIRMINGHAM, Sept. 13.—Pig iron sales are still poor, but shipments have shown moderate improvement. For the first 10 days of September shipments were said to be better than those for the corresponding period of last month, and in some estimates are reported as being 25 per cent greater. Slight increases in stove and pressure pipe requirements were factors in the improvement. Owing to the exceptionally poor record of August, September still gives promise of being a better month.

Little tonnage of any size is reported by pressure pipe manufacturers; small carload lots are interspersed with an occasional larger order. Operations this week are lower than those of the past several weeks. The National Cast Iron Pipe Co. is idle this week after operating one plant last week. The American Cast Iron Pipe Co. is operating one plant this week for about three days. Last week it operated two plants. The schedules of other companies correspond. Blast furnace operations continue with two active stacks. These are the Fairfield No. 6 of the Tennessee company, operating on basic, and the No. 2 of the Woodward Iron Co., operating on foundry.

The quotation of $11 for the Southern market is reported more stable than in some time.

Steel

Sales this month are ahead of those for the same period of last month and an increase in inquiries is also reported. Roofing sheets, wire, nails and other agricultural requirements continue to head new tonnage, with sheets the most active. Interest is being shown in bars owing to road awards scheduled for the near future. On the whole, the situation has not changed a great deal in the past few weeks, but producers term conditions "fairly satisfactory." Very little tonnage is reported by fabricators.

Open-hearths in operation last week numbered seven, and this is the probable schedule for the present week. The Tennessee company continues with three at Fairfield and the Gulf States Steel Co. with four at Alabama City. Gulf States Steel has lately increased finishing operations. The sheet mill is running on a full schedule, blooming mill five days, wire mill four days, and other departments on lesser schedules.

St. Louis Stove Plants Taking More Pig Iron

ST. LOUIS, Sept. 13.—Stove plants continue to be the principal consumers of foundry iron, this being their season of greatest activity. Their purchases have been more liberal than for some time, although operations are far behind those of a year ago. Jobbing foundries catering to the railroad, automotive and construction lines are quiet. Shipments of the St. Louis Gas & Coke Corpn. for the first 10 days of September are 30 per cent ahead of those in the same period last month, and incoming orders are increasing in volume, although small, ranging from carloads to 500 tons. The price situation is unchanged and firm.

Steel

Open-hearth operations in the St. Louis industrial district were increased this week to approximately 18 per cent of capacity. The Central Paving & Construction Co., St. Louis, has been awarded the general contract for two bridges for the St. Louis-San Francisco Railway and the municipality. The State of Missouri will require 1000 tons of structural steel and 900 tons of reinforcing bars for various highway projects to be awarded this week. Railroads report an improvement in business since Labor Day, but no buying movement has manifested itself.

Scrap

The scrap market is stronger, largely on expectations that a buying movement will start soon and a shortage of supplies, according to dealers, who declare railroads centering here have offered little, and there is no incentive for country dealers to ship at present prices. Buying by mills has been light, but inquiries have been encouraging. Nos. 1 and 2 heavy melting steel and railroad malleable are 50c. a ton higher, rails for rolling are $1 higher and railroad springs are up 75c. Railroad lists: Louisville & Nashville, 28,500 tons; Baltimore & Ohio, 2570 tons; Alton, 1400 tons; Wabash, 810 tons; Chicago, Rock Island & Pacific, 700 tons, and Kansas City Southern, 400 tons.

Fabricated Structural Steel

Awards Decline—New Projects Slightly Lower

WITH the exception of 2000 tons for bridges in Texas, bookings of 13,800 tons were mostly in small tonnages. Public works account for about 11,900 tons and include bridges, schools and post office buildings. New projects of 12,300 tons compare with 13,300 tons a week ago. The only sizable inquiry is 2400 tons for a bridge in Wisconsin over the Chippewa River, on which bids will be opened this week. Awards follow:

NORTH ATLANTIC STATES

Dorchester, Mass., 940 tons, girls' high school, to Boston Structural Steel Co.

Berlin, Conn., 105 tons, highway bridge, to American Bridge Co.

Norwich, N. Y., 100 tons, bridge in Chenango County, to Smith-Caffrey.

Elmira, N. Y., 275 tons, shop building, State reformatory, to Shippers Car Line Corpn.

Peekskill, N. Y., 100 tons, Montrose School, to Fort Chester Iron Works.

Rochester, N. Y., 325 tons, Arcade building, to F. L. Hueghes & Co., Rochester.

Enola, Pa., 375 tons, crane runway for Pennsylvania Railroad, to American Bridge Co.

Baltimore, 225 tons, school for colored children, to Lehigh Structural Steel Co.

Baltimore, 130 tons, coal pocket, to Dietrich Brothers.

Washington, 190 tons, Taft High School, to Barber & Ross.

Pittsburgh, 155 tons, Glen Shaw Glass Co. building, to Pittsburgh Engineering, Foundry & Construction Co.

SOUTH AND SOUTHWEST

Ronceverte, W. Va., 480 tons, highway bridge over Greenbrier River, to Independent Bridge Co.

State of Virginia, 260 tons, Eagle Rock bridge, to Virginia Bridge & Iron Co., Inc.

State of Virginia, 130 tons, bridges over Pigg River and Pamunkey River, to Virginia Bridge & Iron Co., Inc.

Newport News, Va., 165 tons, Finch Building, to Virginia Bridge & Iron Co., Inc.

Durham, N. C., 360 tons, post office, to Fort Pitt Bridge Works Co.

State of Georgia, 600 tons, bridges, to Virginia Bridge & Iron Co., Inc.

Lexington, Ky., 835 tons, post office, to Fort Pitt Bridge Works Co.

Danville, Va., 285 tons, post office, to Fort Pitt Bridge Works Co.

Jackson, Miss., 840 tons, post office, to Ingalls Iron Works.

State of Texas, 2000 tons, highway bridges; 1050 tons to Mosher Steel & Machinery Co., 650 tons to Petroleum Iron Works, 200 tons to Austin Bros. Bridge Co., and 100 tons to Virginia Bridge & Iron Co., Inc.

Alamogordo, N. M., 200 tons, beam spans, to Clinton Bridge Works.

State of Oklahoma, 200 tons, highway bridge, to J. B. Klein Iron & Foundry Co.

CENTRAL STATES

State of Wisconsin, 700 tons, highway bridges, to Wausau Iron Works.

Chicago & Northwestern Railroad, 250 tons, bridge at Wescona, Wis., to McClintic-Marshall Corpn.

Elgin, Joliet & Eastern Railroad, 200 tons, bridge, to American Bridge Co.

State of Wisconsin, 140 tons, highway bridge, to Wisconsin Bridge & Iron Co.

State of Missouri, 310 tons, bridges in Andrew and Fettis counties, to St. Joseph Structural Steel Co.

Pulaski County, Mo., 450 tons, highway bridge, to Stupp Brothers Bridge & Iron Co.

Dubuque, Iowa, 350 tons, post office, to McClintic-Marshall Corpn.

Ogallala, Neb., 400 tons, beam bridges, to Omaha Steel Co.

WESTERN STATES

Boulder City, Nev., 130 tons, warehouse, to Consolidated Steel Corpn.

Sunnyvale, Cal., 300 tons, dirigible mooring mast, to Wellman Engineering Co.

Mare Island, Cal., 700 tons, two derricks for United States Navy, to Moore Dry Dock Co.

Glendale, Cal., 100 tons, Canada Boulevard bridge, to Virginia Bridge & Iron Co., Inc.

Los Angeles, 225 tons, garage and shop for Southern California Gas Co., to Consolidated Steel Corpn.

Longview, Wash., 200 tons, post office, to Pacific Iron & Steel Co.

Colusa, Cal., 190 tons, sheet steel piling for Sacramento River Federal weir, to George C. Pollock Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

State of New York, 300 tons, highway bridge at Ausable Chasm.

State of New York, 500 tons, highway bridges.

Philadelphia, 400 tons, Girls' High School; John McShain, Philadelphia, general contractor.

Beaver County, Pa., 270 tons, State highway route 115; Mike Manella, Pittsburgh, low bidder.

State of Pennsylvania, 270 tons, highway bridges in Crawford, Tioga and Wayne Counties.

THE SOUTH

Louisville, 450 tons, sheet steel piling for Southwestern Outfall Sewer.

CENTRAL STATES

Cincinnati, 250 tons, horses and props for Dams No. 29 and 30, for United States Engineer.

Chicago, 700 tons, Chrysler building for Century of Progress.

State of Wisconsin, 2400 tons, highway bridge over Chippewa River; bids to be opened this week.

Elbowoods, N. D., 1900 tons, highway bridge over Missouri River.

Chicago, 650 tons, storage building for Cargill Grain Co.

Ottawa, Ill., 1800 tons, bridge, bids rejected and will be readvertised.

Joliet, Ill., 1000 tons, McDonough Street bridge.

St. Louis, 900 tons, two bridges across River Des Peres for St. Louis-San Francisco Railroad and municipality; general contract awarded to Central Paving & Construction Co.

Schuyler County, Ill., 168 tons, highway bridge; bids opened Sept. 14.

St. Louis, 170 tons, negro municipal hospital; general contract awarded to Kaplan-McGowan Co.

WESTERN STATES

Dostero, Colo., 950 tons, cutoff for Denver & Rio Grande Western Railroad; application for loan from Reconstruction Finance Corporation approved by Interstate Commerce Commission.

Hoover Dam, 800 tons, building for Babcock & Wilcox Co.

Paradise, Mont., 275 tons, State highway bridge.

Pasadena, Cal., 120 tons, gates for Pine Canyon dam; bids close Sept. 13.

Clark County, Nev., 220 tons, Muddy River State highway bridge; bids close Sept. 28.

Shasta County, Cal., 234 tons, Hat Creek and Pit River State highway bridges; bids close Sept. 28.

Raymond, Wash., 700 tons, Willapa River State highway bridge; bids close Oct. 4.

FABRICATED PLATES

AWARDS

San Francisco, 100 tons, Lighthouse No. 76, to General Engineering & Dry Dock Co.

Los Angeles, 100 tons, tank project, to Pacific Iron & Steel Co.

Reinforcing Steel

Awards 4000 Tons — New Projects 9100 Tons

AWARDS

State of New York, 2000 tons, mesh, several highway construction projects, to American Steel & Wire Co.

Thiells, N. Y., 425 tons, State hospital buildings at Letchworth Village, to Concrete Steel Co.

Chicago, 720 tons, United States Appraisers' stores, to Calumet Steel Co.; previously reported to an unnamed bidder.

State of Kentucky, 100 tons, roadwork, to Calumet Steel Co.

Superior, Wis., 100 tons, grade separation, to Kalman Steel Corpn.

San Francisco, 160 tons, Jewish Center building, to Pacific Coast Steel Co.

Oakanogan County, Wash., 160 tons, two State highway bridges, to an unnamed bidder.

Alameda County, Cal., 113 tons, Castro Hill highway structures, to Soule Steel Co.

Merced County, Cal., 105 tons, Merced River bridge, to Kyle & Co.

Colusa, Cal., 320 tons, Sacramento River Federal weir, to Soule Steel Co.

Seattle, 157 tons, Aurora and Forty-sixth Avenue highway crossing, to Pacific Coast Steel Co.

Seattle, 189 tons, Aurora and Fiftieth Avenue State highway crossing, to Northwest Steel Rolling Mills.

Longview, Wash., 130 tons, post office, to Truscon Steel Co.

NEW REINFORCING BAR PROJECTS

State of New York, 800 tons, highway construction, route 2, section 9, at Suffern.

Buffalo, 200 tons, new police headquarters.

Beaver County, Pa., 250 tons, State highway route 115; Mike Manella, Pittsburgh, low bidder.

Louisville, Ky., 3300 tons, sewer; bids Sept. 15.

Louisville, 900 tons, high school.

Oak Park, Ill., 150 tons, post office.

Sheboygan, Wis., 200 tons, municipal sewer work; bids in.

State of Missouri, 900 tons, highway projects.

Fox River, Ill., 600 tons, bridge to be constructed jointly by the city and State of Illinois.

Springfield, Ill., 950 tons, water system.

Vermilion Parish, La., 200 tons, lock for Intercoastal Canal.

El Reno, Okla., 500 tons, Government hospital; bids Sept. 15.

Los Angeles, 112 tons, Verdugo Wash bridge; Blue Diamond Corpn., low bidder.

Pipe Lines

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 27 for 51,700 ft. galvanized welded steel pipe (Schedule 8705) for Boston, Los Angeles or f.o.b. works.

Shell Pipe Line Corpn., operated by Shell Union Oil Co., St. Louis, has begun new 6-in. pipe line in east Texas oil fields, connecting with 10-in. trunk line to terminal at Houston, Tex.

Consumers Power Co., Jackson, Mich., is planning installation of natural gas pipe line from central Michigan gas fields to Bay City and Saginaw, Mich., and vicinity.

St. Louis Western Natural Gas Co., St. Louis, care of Herbert S. Hadley, 722 Chestnut Street, representative, plans installation of natural gas distributing system at St. Louis. R. M. McWilliams, Jr., is president.

Break in London Non-Ferrous Markets Has Slowed Up Buying Here

NEW YORK, Sept. 13.—Standard copper dropped £4 10s. and electrolytic fell £4 on the London exchange this morning. The sharp revisions were apparently due to heavy liquidation of copper holdings by foreign speculative interests, accompanying the broad downward movement of security values here. Some latent resistance to the early price weakness was indicated in London second cables, which reported that prices had regained £1 of the losses this afternoon. Notwithstanding the irregularities in the London prices, a small lot of electrolytic was sold today in New York for export delivery at 6.25c., though the prevailing export quotation is not clearly established at that level. During the week, export copper prices ranged from 6.15c. to 6.35c., c.i.f. usual foreign ports, but recent foreign sales have failed to reach important proportions. The domestic price for electrolytic, which was established on Sept. 7 at 6.25c., Connecticut basis, has thus far apparently resisted the stress of weakness abroad. In view of the unsettlement in foreign markets, however, domestic consuming interest has momentarily dried up. The trade here is not very sanguine that the recent improvement in demand will progress further until world copper markets reflect steadier tendencies. Demand for Lake copper is quiet, though minor sales have been made at the current delivered quotation of 6.37½c.

Tin

After reaching 25.62½c. a lb. on Sept. 7, the highest level of the present upward movement, the New York price of spot Straits tin receded gradually during the week to the current level of 24.50c. This reverse trend in price was in sympathy with ebbing values in London tin. Although trading in New York has slowed down from the brisk pace of recent weeks, current demand reflects a rather well sustained interest on the part of tin consumers. The London market today, influenced by weakness in other commodity and security prices, dropped sharply. Spot standard was quoted at £147 10s. a ton, future standard at £149 and spot Straits at £152 15s. Today's Singapore market was £155 15s., a net loss of £7 for the week. United Kingdom warehouse stocks of tin were 32,211 tons at the close of last week, a drop of 80 tons from the previous total.

Lead

Liquidation in the London market today, with an attendant drop in lead prices there, had little direct influence upon the domestic situation, except possibly to further subdue buying interest. The present relatively quiet condition of the domestic market is not considered to be unusual, however, and is characterized more correctly as an aftermath of a prolonged buying movement than as a result of foreign conditions. With practically all of September needs covered and with about 50 per cent of October requirements placed, leading smelters look for little change in buying activity until the last week of September. Prices are well maintained at 3.45c., St. Louis, and 3.60c., New York.

Zinc

Although consumptive demand is exceedingly quiet, the market still reflects a strong position. Statistics for August, which showed a sharp gain in shipments over July deliveries and a decrease of 4700 tons in zinc stocks, undoubtedly have contributed to the underlying strength. An advance of $2 a ton in the price of ore has also injected a firmer tone to zinc prices, which are somewhat higher at 3.82c. a lb., New York, and 3.45c., East St. Louis.

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The Week's Prices. Cents Per Pound for Early Delivery

	Sept. 7	Sept. 8	Sept. 9	Sept. 10	Sept. 12	Sept. 13
Lake copper, New York	6.37½	6.37½	6.37½	6.37½	6.37½	6.37½
Electrolytic copper, N. Y.*	6.00	6.00	6.00	6.00	6.00	6.00
Straits tin, spot, N. Y.	25.62½	25.55	25.20	....	24.80	24.50
Zinc, East St. Louis	3.40	3.40	3.45	3.45	3.45	3.45
Zinc, New York	3.77	3.77	3.82	3.82	3.82	3.82
Lead, St. Louis	3.45	3.45	3.45	3.45	3.45	3.45
Lead, New York	3.60	3.60	3.60	3.60	3.60	3.60

*Refinery quotation, price ¼c. higher delivered in the Connecticut Valley.

Aluminum, 98 to 99 per cent pure, 22.50c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 5.75c. a lb., New York.
Brass ingots, 85-5-5-5, 6.25c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits, pig	26.50c. to 27.50c.
Tin, bar	28.50c. to 30.50c.
Copper, Lake	7.75c. to 8.75c.
Copper, electrolytic	7.50c. to 8.50c.
Copper, casting	7.25c. to 8.25c.
*Copper sheets, hot-rolled	15.37½c.
*High brass sheets	12.50c.
*Seamless brass tubes	15.25c.
*Seamless copper tubes	14.37½c.
*Brass rods	10.25c.
Zinc, slabs	4.25c. to 4.75c.
Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Lead, American pig	4.25c. to 4.75c.
Lead, bar	5.75c. to 6.75c.
Lead sheets	8.00c.
Antimony, Asiatic	8.00c. to 9.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum, No. 1 for remelting, 98 to 99 per cent.	16.00c.
Solder, ½ and ½	15.75c. to 16.75c.
Babbitt metal, commercial grade	21.00c. to 32.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	28.00c.
Tin, bar	30.00c.
Copper, Lake	6.625c.
Copper, electrolytic	6.625c.
Copper, casting	6.375c.
Zinc, slab	4.25c. to 4.50c.
Lead, American pig	4.00c. to 4.25c.
Lead, bar	7.25c.
Antimony, Asiatic	8.50c.
Babbitt metal, medium grade	16.50c.
Babbitt metal, high grade	32.50c.
Solder, ½ and ½	17.75c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	4.625c.	5.375c.
Copper, hvy. and wire	4.50c.	5.25c.
Copper, light and bottoms	3.625c.	4.25c.
Brass, heavy	2.50c.	3.00c.
Brass, light	2.00c.	2.50c.
Hvy. machine composition	3.50c.	4.25c.
No. 1 yel. brass turnings	2.75c.	3.125c.
No. 1 red brass or compos. turnings	3.00c.	3.75c.
Lead, heavy	2.875c.	3.25c.
Zinc	1.375c.	1.75c.
Cast aluminum	2.75c.	4.25c.
Sheet aluminum	6.50c.	8.00c.

Buffalo Pig Iron Trade Has Large Inquiries

BUFFALO, Sept. 13.—A New England pig iron inquiry for 5000 tons of foundry is one of the largest that has appeared in several months. Other inquiries are for 500 tons and 1000 tons, and there are quite a few of these. One producer estimates that at least half of the pig iron buyers of the district believe that the time to purchase has finally arrived. In several cases inquiries are coming out for the first quarter of 1933, and producers have been asked to quote even as far ahead as the second quarter of 1933.

Steel

The Lackawanna plant of Bethlehem Steel is this week operating three open-hearths The Republic plant is idle on its alternate week schedule. Improved interest is noticeable in sheets.

Scrap

The market remains firm, although there has been little or no new purchasing in the past week.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.91c.
Del'd New York	1.95c.
Del'd Detroit	1.80c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.75c.
C.i.f. Pacific ports	2.10c.

Billet Steel Reinforcing
(as quoted by distributers)

F.o.b. P'gh mills, 40, 50, 60-ft.	1.60c.
F.o.b. Birmingham, mill lengths	1.75c.
F.o.b. Cleveland	1.60c. to 1.75c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.35c. to 1.45c.
F.o.b. Chicago Heights mills	1.50c.

Iron

Common iron, f.o.b. Chicago	1.60c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.11c.
Common iron, del'd New York	2.15c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7935c.
F.o.b. Coatesville	1.70c.
F.o.b. Sparrows Point	1.70c.
Del'd New York	1.898c.
C.i.f. Pacific ports	2.00c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7495c.
Del'd New York	1.86775c.
C.i.f. Pacific ports (standard)	2.10c.
C.i.f. Pacific ports (wide flange)	2.20c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.05c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.45c. to 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
2000 (1½% Nickel)	$0.25
2100 (1½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3500 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.16 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and Squares	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ⅜c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 sq. in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Cold Finished Bars*

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	1.70c.
Bars, f.o.b. Chicago	1.75c.
Bars, Cleveland	1.75c.
Bars, Buffalo	1.75c.
Bars, Detroit	1.90c.
Bars, eastern Michigan	1.95c.
Shafting, ground, f.o.b. mill	†2.05c. to 3.00c.

*In quantities of 10,000 to 19,999 lb.
†According to size.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot-Rolled

	Base per Lb.
No. 10 f.o.b. Pittsburgh	1.55c.
No. 10 f.o.b. Chicago mill	1.65c.
No. 10 del'd Philadelphia	1.86c.
No. 10 f.o.b. Birmingham	1.70c.
No. 10, c.i.f. Pacific Coast ports	2.17½c.

Hot-rolled and Annealed

No. 10, Pittsburgh	1.70c.
No. 10, Chicago mills	1.80c.
No. 10, Birmingham	1.85c.
No. 10, Pacific Coast ports	2.32½c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.10c. to 2.20c.
No. 24, f.o.b. Chicago mills	2.20c. to 2.30c.
No. 24, del'd Philadelphia	2.46c. to 2.51c.
No. 24, f.o.b. Birmingham	2.25c. to 2.35c.
No. 24, c.i.f. Pacific Coast ports	2.85c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.15c. to 2.25c.
No. 10 gage, f.o.b. Chicago mills	2.25c. to 2.35c.
No. 10, gage, del'd Philadelphia	2.46c. to 2.56c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.60c. to 2.75c.
No. 20 gage, f.o.b. Chicago mills	2.70c. to 2.85c.
No. 20 gage, del'd Philadelphia	2.91c. to 3.06c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	2.75c.

Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh	2.55c. to 2.65c.
No. 20, f.o.b. Pittsburgh	3.05c. to 3.15c.

(Prices on furniture stock include stretcher leveling but not resquaring.)

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.75c. to 2.85c.
No. 24, f.o.b. Chicago mills	2.85c. to 2.95c.
No. 24, del'd Philadelphia	3.06c. to 3.16c.
No. 24, f.o.b. Birmingham	2.90c. to 3.00c.
No. 24, c.i.f. Pacific Coast ports	3.50c.

Long Ternes

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh	2.80c.

Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh	2.50c. to 2.60c.
No. 20, f.o.b. Pittsburgh	3.00c. to 3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.30c. to 2.40c.
No. 28, Chicago mill	2.40c. to 2.50c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	$4.75
Standard cokes, f.o.b. Gary	4.85

Terne Plate

(F.o.b. Morgantown or Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$9.50
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.10
30-lb. coating I.C.	14.90
40-lb. coating I.C.	16.70

Hot-rolled Hoops, Bands and Strips

	Base per Lb.
All widths up to 24 in., Pittsburgh	1.45c. to 1.50c.
All widths up to 24 in., Chicago	1.55c. to 1.60c.
Cooperage stock, P'gh	1.55c. to 1.60c.
Cooperage stock, chicago	1.65c. to 1.70c.

Cold-Rolled Strips

F.o.b. Pittsburgh	1.90c. to 2.00c.
F.o.b. Cleveland	1.90c. to 2.00c.
Del'd Chicago	2.20c. to 2.30c.
F.o.b. Worcester	2.20c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	2.75c. to 2.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)

(After Dec. 31, extras of 10c. a 100 lb. on mixed and joint carloads, 25c. on pool carloads and 40c. on less than carloads will be applied on all merchant wire products.)

To Manufacturing Trade

Bright wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade

	Base per Keg
Standard wire nails	$1.95
Smooth coated nails	1.95
Galvanized nails	3.95

	Base per Lb.
Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Polished staples	2.50c.
Galvanized staples	2.75c.
Barbed wire, galvanized	2.60c.
Woven wire fence, No. 9 gage, per net ton	$55.00
Woven wire fence, No. 12½ gage and lighter, per net ton	60.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $5 a ton over Pittsburgh.

STEEL PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Iron Inches	Iron Black	Iron Galv.
⅛	51½	28½	⅛ and ¼	+9	+31
¼ to ⅜	57	34	⅜	25	7
½	62	40½	½	30	13
¾	65½	55	¾	35	17
1 to 3	67½	57	1 and 1¼	35	17
			1½ and 2	37	20

Lap Weld

2	61	50½	25	11
2½ to 6	64½	54	2½ to 3½	30	15
7 and 8	62	51	4 to 6	32	19
9 and 10	60	49	7 and 8	31	18
11 and 12	59	48	9 to 12	28	13

Butt Weld, extra strong, plain ends

⅛	48	33	¼ and ⅜	+11	+46
¼ to ⅜	53½	38½	½	25	9
½	59	49½	¾	30	14
¾	63½	54	1 to 2	36	20
1 to 1½	65½	56			
2 to 3	66½	57			

Lap Weld, extra strong, plain ends

2	50	43½	2	31	15
2½ to 4	62½	53	2½ to 4	36	22
4½ to 6	62	52½	4½ to 6	35	21
7 to 8	58	47	7 and 8	33	19
9 and 10	51½	40½	9 to 12	23	10
11 and 12	50½	39½			

Discounts on steel pipe are net and not subject to any points or preferentials. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel

2 in. and 2¼ in.	38
2½ in.—2¾ in.	46
3 in.	52
3¼ in.—3¾ in.	54
4 in.	57
4½ in. to 6 in.	46

Charcoal Iron

1½ in.	1
1¾ in.	8
2 in.—2¼ in.	13
2½ in.—2¾ in.	16
3 in.	17
3¼ in. to 3½ in.	18
4 in.	20
4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes
Cold-Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard gages takes the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	32.00
Light (from rail steel, f.o.b. mill)	$28.00 to $30.00

Track Equipment

	Base per 100 Lb.
Spikes, 9/16-in. and large	$2.60
Spikes, ½-in. and large	2.60
Spikes, boat and barge	2.80
Tie plate, steel	1.85
Angle bars	2.75
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, per 100 count	73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	75
†Carriage bolts	75
Lag bolts	75
Plow bolts, Nos. 1, 2, 3 and 7 heads	75
Hot-pressed nuts, blank or tapped, square	75
Hot-pressed nuts, blank or tapped, hexagons	75
C.p.c. and t. square or hex nuts, blank or tapped	75
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
†Bolts with rolled thread up to and including ⅝ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	75
Semi-finished hexagon castellated nuts, S.A.E.	75
Stove bolts in packages, P'gh	77½, 25 and 10
Stove bolts in packages, Chicago	77½, 25 and 10
Stove bolts in pkgs., Cleveland	77½, 25 and 10
Stove bolts in bulk, P'gh	86
Stove bolts in bulk, Chicago	86
Stove bolts in bulk, Cleveland	86
Tire bolts	60 and 10

Discount of 75 per cent off on bolts and nuts applies on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

	Base per Lb.
F.o.b. Pittsburgh or Cleveland	$3.25
F.o.b. Chicago	3.35

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

Discounts to Jobbers
(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	80 and 25
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread, ⅜ in. and smaller	75 and 10
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	80, 25 and 10
Upset set screws, sq. head, 1 in. dia. and smaller	75, 10 and 10
Upset set screws, 1⅛ in. and larger	75 and 10
Milled studs	70

SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	$26.00
Rerolling, 4-in. and under 10-in., Youngstown	26.00
Rerolling, 4-in. and under 10-in., Cleveland	26.00
Rerolling, 4-in. and under 10-in., Chicago	29.00
Forging quality, Pittsburgh	33.00
Forging quality, Youngstown	33.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

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(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$37.00
Cleveland	37.00
Chicago	38.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.00
Furnace, f.o.b. Connellsville prompt	$2.75 to 4.25
Foundry, by-product, Chicago ovens, for delivery outside switching districts	7.00
Foundry, by-product, delivered in Chicago switching district	7.75
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	7.82
Foundry, Birmingham	5.00
Foundry, by-products, St. Louis, f.o.b., ovens	8.00
Foundry, by-products, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.20 to $1.30
Mine run coking, coal, f.o.b. W. Pa.	1.30 to 1.40
Gas coal, ¾-in., f.o.b. Pa. mines	1.30 to 1.40
Mine run gas coal, f.o.b. Pa. mines	1.30 to 1.40
Steam slack, f.o.b. W. Pa. mines	0.50 to 0.65
Gas slack, f.o.b. W. Pa. mines	0.50 to 0.65

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	2.75c.
No. 5 industrial fuel oil	2.45c.
Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.00c.
No. 4 industrial	4.50c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works	
	High-heat Duty Brick	Intermediate Duty Brick
Penn.	$35.00	$25.00 to $30.00
Maryland	35.00	25.00 to 30.00
New Jer.	$44.00 to 57.00	
Ohio	35.00	25.00 to 30.00
Kentucky	35.00	25.00 to 30.00
Missouri	35.00	30.00
Illinois	35.00	25.00 to 30.00
Ground fire clay, per ton	6.50	

Chrome Brick

	Per Net Ton
Standard size	$42.50

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$38.00
Chicago	47.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	$61.50
Unburned, f.o.b. Baltimore	52.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	38.50
Domestic, f.o.b. Chewelah, Wash.	20.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$38.40 to $41.40
4-in., del'd Chicago	41.40 to 44.40
6-in., and larger, del'd New York	31.30
4-in., del'd New York	34.30
6-in., and larger, Birm'ham	$32.00 to 33.00
4-in., Birmingham	35.00 to 36.00

Class "A" and gas pipe, $3 extra.

Pig Iron, Ores, Ferroalloys

VALLEY

Per gross ton, f.o.b. Valley furnace:

Basic	$13.50
Bessemer	15.00
Gray forge	14.50
No. 2 foundry	14.50
No. 3 foundry	14.00
Malleable	$14.50 to 15.00
Low phos., copper free	23.00 to 25.00

Freight rate to Pittsburgh or Cleveland district, $1.89.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$14.00
No. 2 foundry	15.00
No. 3 foundry	14.50
Malleable	15.00
Bessemer	15.00

Freight rates to points in Pittsburgh district range from 69c. to $1.26.

CHICAGO

Per gross ton at Chicago furnace:

N'th'n No. 2 fdy.	$15.50
N'th'n No. 1 fdy.	16.00
Malleable, not over 2.25 sil.	15.50
High phosphorus	15.50
Lake Super. charcoal, sil. 1.50, by rail	23.17
Southern No. 2 fdy.	16.14
Low phos., sil. 1 to 2, Copper free.	25.00
Silvery, sil. 8 per cent.	23.67
Bess. ferrosil'n, 15 per cent.	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.50
Malleable, f.o.b. Granite City	17.50
Northern No. 2 fdy., del'd St. Louis	$18.30 to 18.80
Southern No. 2 fdy. del'd.	14.56
Northern malleable, del'd.	18.30 to 18.80
Northern basic, deliv'd.	18.30 to 18.80

Freight rates 83c. (average) Granite City to St. Louis; $2.30 from Chicago; $4.56 from Birmingham.

NEW YORK

Per gross ton, delivered New York district:

* Buffalo, No. 2, del'd east N. J.	$17.41 to $17.66
East Pa. No. 2 fdy.	15.02 to 15.52
East Pa. No. 2X fdy.	15.52 to 16.02

Freight rates: $1.52 to $2.63 from eastern Pennsylvania.

* Prices delivered to New Jersey cities having rate of $3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:

No. 2 fdy.	$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal, del'd	23.41

NEW ENGLAND

Per gross ton delivered to most New England points:

* Buffalo, sil. 1.75 to 2.25	$19.50 to $20.05
* Buffalo, sil. 2.25 to 2.75	19.05 to 20.05
† Buffalo, sil. 1.75 to 2.25	17.41 to 18.91
† Buffalo, sil. 2.25 to 2.75	17.41 to 18.91
* Ala., sil. 1.75 to 2.25	19.74
* Ala. sil. 2.25 to 2.75	20.24
†Ala., sil. 1.75 to 2.25	15.88
† Ala, sil. 2.25 to 2.75	16.28

Freight rates: $5.05 all rail from Buffalo, and $3.41 to $3.91 rail and water from Buffalo when $1 barge and $2 to $2.50 New England freight rate are obtainable; $9.75 all rail from Alabama and $5.88 rail and water from Alabama to New England seaboard.

* All-rail rate.

† Rail-and-water rate.

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$13.82
Ala. fdy., sil. 2.25 to 2.75	14.32
Tenn. fdy., sil. 1.75 to 2.25	13.82
N'th'n No. 2 foundry	$17.01 to 17.59
S'th'n Ohio silvery, 8%	21.02

Freight rates, $2.02 from Ironton and Jackson, Ohio; $3.82 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

East. Pa. No. 2	$13.84 to $14.34
East. Pa. No. 2X	14.34 to 14.84
East. Pa. No. 1X	14.84 to 15.34
Basic (del'd east. Pa.)	13.50 to 14.00
Malleable	16.50 to 18.00
Stand. low phos. (f.o.b. east. Pa. furnace)	20.50 to 21.50
Con. b'r'g low phos. (f.o.b. furnace)	20.50 to 21.50
Va. No. 2	21.79
Va. No. 2X	22.29
Va. No. 2 plain	21.54 to 22.04
Va. No. 2X	22.04 to 22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 84c. to $1.79 from eastern Pennsylvania furnaces: $4.67 from Virginia furnaces.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy. (local delivery)	$15.00
S'th'n fdy. sil. 1.75 to 2.25	16.14
Malleable (local delivery)	15.00
Ohio silvery, 8 per cent	21.87
Stand. low. phos., Valley	23.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 63c. average local switching charge; $3.12 from Jackson, Ohio; $6.14 from Birmingham.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnace:

No. 2 fdy., 1.75 to 2.25 sil.	$11.00
No. 2 soft, 2.25 to 2.75 sil.	11.50
Basic	11.00

CANADA

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	$23.00 to 23.50

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	$68.00
Foreign, 80%, Atlantic or Gulf port, duty paid	68.00

Prices for lots of one carload or more; extras applied on less than carload lots.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$25.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (less carloads)	85.00
75% (carloads)	126.00
75% (less carloads)	136.00
14% to 16% (f.o.b.) Welland, Ont., in carloads	31.00
14% to 16% (less carloads)	36.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	$20.50	14%	$23.50
11%	21.00	15%	24.00
12%	21.50	16%	25.00
13%	22.50	17%	26.50

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
6%	$18.00	12%	$20.50
7%	18.50	13%	21.50
8%	18.75	14%	22.50
9%	19.00	15%	23.00
10%	19.50	16%	24.00
11%	20.00	17%	25.50

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	$1.08
Ferrotungsten, less carloads	$1.15 to 1.20
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	16.00c
Ferrochromium, 2% carbon	17.00c to 17.50c
Ferrochromium, 1% carbon	19.00c to 20.00c
Ferrochromium, 0.10% carbon	23.50 to 25.00c
Ferrochromium, 0.06% carbon	25.50c to 27.00c
Ferrovanadium, del., per lb. contained Va.	$3.05 to 3.10
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	68.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton	$91.00
Silico spiegel, per ton, f.o.b. furnace, car lots	43.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c. to 8.50c
Iron, low phos., Swedish, average 68½% iron	9.00c
Iron, basic or foundry, Swedish, average 65% iron	8.00c
Iron, basic or foundry, Russian, aver. 63% iron (nom.)	9.00c.
Manganese, Caucasian, washed 52%	24.00c.
Manganese, African, Indian, 50-52%	23c. to 24c.
Manganese, Brazilian, 46 to 48%	21c. to 22c.

	Per Gross Ton
Tungsten, Chinese wolframite	$10.75 to $11.00
Tungsten, domestic scheelite	$10.00 to 10.50
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic seaboard	18.00
Chrome, 48%, Cr_2O_3, c.i.f. Atlantic seaboard	20.00

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines	$10.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	12.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	$16.00 to 16.75
Domestic, No. 1 ground bulk, 85 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$9.00 to $10.50
No. 2 heavy melting steel	8.00 to 8.50
No. 2 railroad wrought	9.50 to 10.00
Scrap rails	9.50 to 10.00
Rails 3 ft. and under	10.50 to 11.00
Sheet bar crops, ordinary	9.50 to 10.00
Compressed sheet steel	9.50 to 10.00
Hand bundled sheet steel	8.00 to 8.50
Hvy. steel axle turnings	7.50 to 8.00
Machine shop turnings	6.00 to 6.50
Short shov. steel turnings	6.00 to 6.50
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
Cast iron carwheels	8.00 to 8.50
Heavy breakable cast	8.00 to 8.50
No. 1 cast	9.50 to 10.50
Railr. knuckles and couplers	9.50 to 10.00
Rail. coil and leaf springs	9.50 to 10.00
Rolled steel wheel	9.50 to 10.00
Low phos. billet crops	10.50 to 11.00
Low phos. sheet bar crops	11.50 to 12.00
Low phos. plate scrap	10.00 to 10.50
Low phos. punchings	10.00 to 10.50
Steel car axles	10.00 to 10.50

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$6.00 to $6.50
Shoveling steel	6.00 to 6.50
Frogs, switches and guards	$6.00 to $6.50
Hydraulic comp. sheets	4.25 to 4.75
Drop forge flashings	4.00 to 4.50
No. 1 busheling	4.00 to 4.50
Rolled carwheels	8.00 to 8.50
Railroad tires	7.50 to 8.00
Railroad leaf springs	8.00 to 8.50
Axle turnings	4.50 to 5.00
Steel couplers and knuckles	7.00 to 7.50
Coil springs	8.50 to 9.00
Axle turnings (elec. fur.)	5.50 to 6.00
Low phos. punchings	8.00 to 8.50
Low phos. plates, 12 in. and under	8.00 to 8.50
Cast iron borings	4.00 to 4.50
Short shoveling turnings	4.00 to 4.50
Machine shop turnings	3.00 to 3.50
Rerolling rails	7.00 to 7.50
Steel rails, less than 3 ft.	8.50 to 9.00
Steel rails, less than 2 ft.	9.00 to 9.50
Angle bars, steel	7.00 to 7.50
Cast iron carwheels	7.00 to 7.50
Railroad malleable	6.75 to 7.25
Agricultural malleable	5.00 to 5.50
* Relaying rails, 56 to 60 lb.	15.00 to 17.00
* Relay rails, 65 lb. and up	18.00 to 23.00

	Per Net Ton
Iron angle and splice bars	$5.25 to $5.75
Iron arch bars, transoms	5.00 to 5.50
Iron car axles	11.00 to 11.50
Steel car axles	8.50 to 9.00
No. 1 railroad wrought	5.00 to 5.50
No. 2 railroad wrought	5.50 to 6.00
No. 1 busheling	2.50 to 3.00

No. 2 bushelling	$2.00 to	$2.50
Locomotive tires, smooth	7.50 to	8.50
Pipe and flues	1.25 to	1.75
No. 1 machinery cast	6.25 to	6.75
No. 1 automobile cast	6.75 to	7.25
No. 1 railroad cast	5.50 to	6.00
No. 1 agricultural cast	5.00 to	5.50
Stove plate	5.50 to	6.00
Grate bars	5.25 to	5.75
Brake shoes	6.25 to	6.75

*Relaying rails, including angle bars matched, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$7.00 to	$7.50
No. 2 heavy melting steel	5.50 to	6.00
No. 1 railroad wrought	7.50 to	8.00
Bundled sheets	4.00 to	4.50
Hydraulic compressed, new	6.00 to	6.50
Hydraulic compressed, old	4.00 to	4.50
Machine shop turnings	3.50 to	4.00
Heavy axle turnings	5.50 to	6.00
Cast borings (nom.)	3.00 to	3.50
Heavy breakable cast	9.00 to	9.50
Long plate (steel works)	6.00 to	6.50
No. 1 low phos. heavy	10.00 to	10.50
Couplers and knuckles	8.00 to	8.50
Rolled steel wheels	8.00 to	8.50
No. 1 blast furnace (nom.)	3.00 to	3.50
Cast iron and steel pipe	5.50 to	6.00
Shafting	11.00 to	11.50
Steel axles	12.00 to	13.00
No. 1 forge fire	5.50 to	6.00
Cast iron carwheels	9.50 to	10.00
No. 1 rail	9.50 to	10.00
Short borings (chem.)	8.00 to	10.00
Steel rails for rolling	9.00 to	9.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$7.00 to	$7.50
No. 2 heavy melting steel	6.50 to	7.00
Compressed sheet steel	6.50 to	7.00
Light bundled sheet stampings	4.50 to	5.00
Drop forge flashings	5.25 to	5.75
Machine shop turnings	4.50 to	5.00
Short shoveling turnings	4.50 to	5.00
No. 1 bushelling	5.25 to	5.50
Heavy axle turnings	5.00 to	5.50
Low phos. billet crops	10.00 to	11.00
No. 1 iron borings	3.50 to	4.00
Mixed borings and short turnings	3.50 to	4.00
No. 2 bushelling	3.50 to	4.00
No. 1 cast	7.50 to	8.00
Railroad grate bars	5.00 to	5.50
Stove plate	5.00 to	5.50
Rails under 3 ft.	8.50 to	9.00
Rails for rolling	8.50 to	9.00
Railroad malleable	6.75 to	7.00
Cast iron carwheels	7.00 to	7.50

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$7.00 to	$7.50
No. 2 heavy melting scrap		6.00
Scrap rails	6.75 to	7.25
Light hydraul. comp. sheets		6.00
Heavy hydraul. comp. sheets		5.00
Drop forge flashings		6.00
No. 1 bushelling		6.00
Heavy steel axle turnings		6.00
Machine shop turnings	4.00 to	4.50
Knuckles and couplers		10.00
Coil and leaf springs		10.00
Rolled steel wheels		10.00
Low phos. billet crops	9.00 to	9.50
Short shov. steel turnings	5.50 to	6.00
Short mixed borings and turnings	3.75 to	4.25
No. 1 iron borings	3.75 to	4.25
No. 2 bushelling	3.50 to	4.00
Steel car axles	10.00 to	11.00
Iron axles	10.00 to	11.00
No. 1 machinery cast	9.50 to	10.00
No. 1 cupola cast	8.50 to	9.00
Stove plate	6.50 to	7.00
Steel rails, 3 ft. and under	9.25 to	9.75
Cast iron carwheels	8.00 to	9.00
Industrial malleable	7.00 to	7.50
Railroad malleable	7.00 to	7.50
Chemical borings	7.50 to	8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$7.00 to	$7.50
Scrap steel rails	7.00 to	7.50
Short shoveling turnings		4.00
Stove plate		6.00
Steel axles		9.00
Iron axles		9.00
No. 1 railroad wrought	4.50 to	5.00
Rails for rolling	8.00 to	8.50
No. 1 cast		8.50
Carwheels		8.50
Clean cast borings, chem.		8.50

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$5.50 to	$6.00
No. 1 heavy melting	5.50 to	6.00
No. 2 heavy melting	5.00 to	5.50
No. 1 locomotive tires	5.00 to	5.50
Misc. steel rails	6.00 to	6.50
Railroad springs	7.25 to	7.75
Rolled sheets	2.00 to	2.50
No. 2 railroad wrought	5.00 to	5.50
No. 1 bushelling	3.00 to	3.50
Cast iron borings and shoveling turnings	2.75 to	3.25
Rails for rolling	7.00 to	7.50
Machine shop turnings	1.50 to	2.00
Heavy turnings	3.00 to	3.50
Steel car axles	8.50 to	9.00
Iron car axles	11.00 to	11.50
No. 1 iron bars and trans.	5.00 to	5.50
No. 1 railroad wrought	3.50 to	4.00
Steel rails less than 3 ft.	7.50 to	8.00
Relaying angle bars	6.00 to	6.50
Cast iron carwheels	5.00 to	5.50
No. 1 machinery cast	6.50 to	7.00
Railroad malleable	4.50 to	5.00
No. 1 railroad cast	5.75 to	6.25
Stove plate	5.50 to	6.00
Relay. rails, 60 lb. and under	16.00 to	16.50
Relay. rails, 60 lb. and over	20.00 to	21.00
Agricult. malleable	4.00 to	4.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$5.00
No. 2 heavy melting steel	3.50
Heavy melting steel (yard)	1.50
No. 1 hvy. breakable cast	$5.00 to 5.25
Stove plate (steel works)	2.25 to 2.75
Machine shop turnings	0.75 to 1.25
Short shoveling turnings	0.75 to 1.25
Cast borings	0.50 to 1.00
No. 1 blast furnace	0.50 to 1.00
Steel car axles	8.00 to 8.50
Spec. iron and steel pipe	2.00 to 2.50
Forge fire	2.25
No. 1 railroad wrought	4.00 to 4.50
No. 1 yard wrought, long	3.25 to 3.50
Rails for rolling	5.00 to 5.50
No. 1 cast	5.50 to 6.00
No. 2 cast	4.50 to 5.00
Stove plate (foundry)	4.75
Malleable cast (railroad)	4.00 to 4.50
Cast borings (chemical)	6.00 to 6.50
Per gross ton, delivered local foundries:	
No. 1 machinery cast	$9.00 to $9.50
No. 1 hvy. cast (cupola size)	7.50 to 8.00
No. 2 cast	4.00 to 4.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$3.35 to	$3.50
Scrap T rails		3.35
Machine shop turnings	0.85 to	1.00
Cast iron borings		1.05
Bundled skeleton, long	2.00 to	2.10
Forge flashings	3.00 to	3.50
Blast furnace scrap	0.90 to	1.00
Forge scrap	3.00 to	3.25
Shafting	9.50 to	10.00
Steel car axles	9.00 to	9.50
Wrought pipe	4.00 to	4.25
Rails for rolling	4.50 to	5.00
Cast iron borings, chemical	7.00 to	7.25
Per gross ton delivered consumers' yards:		
Textile cast	$7.00 to	$7.50
No. 1 machinery cast	7.50 to	8.00
Stove plate	5.00 to	5.25
Railroad malleable	10.50 to	11.00

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$5.00 to	$5.50
Scrap rails for melting	5.00 to	5.50
Loose sheet clippings	1.00 to	1.50
Bundled sheets	3.25 to	3.75
Cast iron borings	3.00 to	3.50
Machine shop turnings	2.75 to	3.25
No. 1 busheling	4.00 to	4.50
No. 2 busheling	2.25 to	2.75
Rails for rolling	6.50 to	7.00
No. 1 locomotive tires	7.00 to	7.50
Short rails	8.00 to	8.50
Cast iron carwheels	6.00 to	6.50
No. 1 machinery cast	7.75 to	8.25
No. 1 railroad cast	7.25 to	7.75
Burnt cast	3.75 to	4.25
Stove plate	3.75 to	4.25
Agricultural malleable	6.75 to	7.25
Railroad malleable	7.25 to	7.75

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting steel	$5.50 to	$6.00
Borings and short turnings	2.75 to	3.25
Long turnings	2.75 to	3.25
No. 1 machinery cast	7.75 to	8.25
Automotive cast	8.50 to	9.00
Hydraul. comp. sheets	5.25 to	5.75
Stove plate	3.75 to	4.25
New No. 1 busheling	4.75 to	5.25
Old No. 2 busheling	1.50 to	2.00
Sheet clippings	2.00 to	2.50
Flashings	4.00 to	4.50

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$7.00	$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast	12.50	10.00
Stove plate	10.00	8.00
Standard carwheels	10.00	8.50
Malleable	10.00	8.00

Warehouse Prices for Steel Products

PITTSBURGH

Base per Lb.

Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	2.95c.
Squares and flats	3.45c.
Hoops and bands, under ¼ in.	2.95c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.15c.
Galv. sheets (No. 24), 25 or more bundles	3.65c.
Hot-rolled sheets (No. 10)	3.10c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	$3.74
Spikes, large	2.50c.
Small	2.75c. to 2.90c.
Boat	2.90c.
Track bolts, all sizes, per 100 count	70 per cent off list
Machine bolts, 100 count	70 per cent off list
Carriage bolts, 100 count	70 per cent off list
Nuts, all styles, 100 count	70 per cent off list
Large rivets, base per 100 lb	$3.60
Wire, black, soft ann'l'd, base per 100 lb	2.75
Wire, galv. soft, base per 100 lb	3.20
Common wire nails, per keg	2.35
Cement coated nails, per keg	2.35

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO

Base per Lb.

Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforc. bars, billet steel	1.65c. to 1.75c.
Rail steel reinforcement	1.50c. to 1.45c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.00c.
Flats and squares	3.50c.
Bands, ⅞ in. (in Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 22)	3.55c.
Galv. sheets (No. 24)	4.10c.
Hot-rolled sheets (No. 10)	3.20c.
Spikes (⅞ in. and lighter)	3.45c.
Track bolts	4.30c.
Rivets, structural	3.75c.
Rivets, boiler	3.75c.
	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Coach and lag screws	70
Hot-pressed nuts, sq., tap. or blank	70
Hot-pressed nuts, hex., tap. or blank	70
Hex. head cap screws	80
Cup point set screws	70 and 10
Flat head bright wood screws	5-2½
Spring cotters	60
Stove bolts	80
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	$4.50 off list
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.50
Cement c't'd nails, base per keg	2.30

NEW YORK

Base per Lb.

Plates and struc. shapes	2.70c. to 3.10c.
Soft steel bars, small shapes	2.70c. to 3.10c.
Iron bars	3.25c.
Iron bars, Swed. charcoal	6.00c. to 6.50c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	2.80c.
Flats and squares	3.80c.
Cold roll. strip, soft and quarter hard	4.95c.
Hoops	3.30c.
Bands	3.30c.
Hot-rolled sheets (No. 10)	3.00c. to 3.25c.
Hot-rolled ann'l'd sheets (No. 24*)	3.50c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	4.50c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.60c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel, ⅝ x ⅛ in. and larger, smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open hearth spring steel, bases	3.50c. to 7.00c.
Common wire nails, base, per keg	$2.60

	Per Cent
Machine bolts, cut thread	Off List
¾ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread	
½ x 6 in. and smaller	65 to 65 and 10
⅝ x 20 in. and smaller	65 to 65 and 10
Boiler Tubes	Per 100 Ft.
Lap welded, 2-in.	$18.65
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.91
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

Base per Lb.

Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.30c.
Hot-rolled annealed sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.25c.
Hot-rolled sheets (No. 10)	3.45c.
Black corrug. sheets (No. 28)	4.20c.
Galv. corrug. sheets	4.40c.
Structural rivets	4.00c.
Boiler rivets	4.00c.
	Per Cent Off List
Tank rivets, ⅞ in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	70
Carriage bolts	70
Lag screws	70
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	70
Less than 200 lb.	60
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	70
Less than 200 lb.	60

PHILADELPHIA

Base per Lb.

*Plates, ¼-in. and heavier	2.10c.
*Structural shapes	2.10c.
*Soft steel bars, small shapes, iron bars (except bands)	2.10c.
Reinforc. steel bars, sq., twisted and deform.	2.20c.
Cold-fin. steel, rounds and hex.	2.25c.
Cold-fin. steel, sq. and flats	3.85c.
*Steel hoops	2.65c.
*Steel bands, No. 12 to 3/16 in., incl.	2.10c.
Spring steel	5.00c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galvanized sheets (No. 24)	3.75c.
*Hot-rolled and annealed sheets (No. 10)	2.55c.
Diam. pat. floor plates, ¼ in.	5.00c.
Swedish iron bars	5.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices for 15,000 lb. orders; extra made for smaller quantities.

CLEVELAND

Base per Lb.

Plates and struc. shapes	2.75c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 1.85c.
Cold-fin. rounds and hex.	2.75c.
Cold-fin. flats and sq.	3.75c.
Flat rolled steel under ⅛ in.	3.00c.
Cold-finished strip	3.55c.
Hot-rolled annealed sheets (No. 24)	3.25c.
Galvanized sheets (No. 24)	3.75c.
Hot-rolled sheets (No. 10)	3.00c.
Black ann'l'd wire, per 100 lb	$2.75
No. 9 galv. wire, per 100 lb	3.20
Com. wire nails, base per keg	2.35

*Not base, including boring and cutting to length.

CINCINNATI

Base per Lb.

Plates and struc. shapes	2.80c.
Bars, soft steel or iron	2.80c.
New billet reinforc. bars	2.00c.
Rails steel reinforc. bars	2.60c.
Hoops	3.90c.
Bands	3.20c.
Cold-fin. rounds and hex.	3.32c.
Squares and flats	3.82c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24)	4.25c.
Hot rolled sheets (No. 10)	3.30c.
Structural rivets	4.00c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c'l'd nails, base 100 lb. keg	2.95
Chain, per 100 lb.	10.25
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$17.50
4-in.	36.00
Lap welded steel boiler tubes, 2-in.	16.50
4-in.	34.50

BUFFALO

Base per Lb.

Plates and struc. shapes	3.20c.
Soft steel bars	2.95c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.50c.
Rounds and hex.	3.60c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.05c.
Bands	3.20c.
Hoops	3.95c.
Hot-rolled sheets (No. 10)	3.45c.
Com. wire nails, base per keg	$2.60
Black wire, base per 100 lb.	3.25

BOSTON

Base per Lb.

Plates	*3.35c.
Structural shapes	*3.35c.
Soft steel bars, small shapes	*3.35c.
Reinforcing bars	3.10c. to 3.25c.
Iron bars—	
Refined	3.25c.
Best refined	4.60c.
Spring steel, open-hearth	5.00c.
Tire steel	4.50c. to 4.75c.
Bands	*3.75 to 4.25c.
Hoop steel	4.90c. to 5.40c.
Cold-rolled steel—	
Rounds and hex	3.60c. to 4.15c.
Squares and flats	4.10c. to 5.35c.
Rivets, structural or boiler	4.80c.
	Per Cent Off List
Machine bolts	65
Carriage bolts	65
Lag screws	65
Hot-pressed nuts	65
Cold-punched nuts	65
Stove bolts	70 and 10

*Base price (250 to 999 lb.); less than 250 lb., add 50c. per 100 lb.; 1000 to 7999 lb., deduct 15c.; 8000 to 14,999 lb., deduct 25c.; 15,000 lb. and larger lots, deduct 35c.

PACIFIC COAST

Base per Lb.

	San Francisco	Los Angeles	Seattle
Plates and struc. shapes, ¼-in. and heavier	3.25c.	3.30c.	3.90c.
Soft steel bars	3.25c.	3.30c.	3.90c.
Reinforcing bars	3.00c.	3.00c.	3.90c.
Hot-rolled annealed sheets (No. 24)	3.95c.	4.20c.	4.50c.
Hot-rolled sheets (No. 10)	3.50c.	3.50c.	4.00c.
Galv. sheets (No. 24)	4.55c.	4.50c.	5.00c.
Struc. rivets, ⅝ in. and larger, less than 1000 lbs.	5.00c.	5.00c.	4.00c.
Cold-finished steel			
Rounds	5.50c.	5.50c.	4.50c.
Squares and hexagons	6.75c.	6.75c.	5.75c.
Flats	7.25c.	7.25c.	6.75c.
Common wire nails, base per keg in less carloads	$2.90	$2.90	$3.00

Plates, shapes, bars, bands and hot-rolled sheets, No. 16 gage and heavier, subject to reductions for quantity. Cold-finished quotations based on 100 lb. minimum quantity.

PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Trade Is More Hopeful

Automobile Company May Spend $100,000—Concerted Modernization Program Expected to Help

THERE is a decidedly more hopeful feeling in the machinery industries notwithstanding the failure of new business to materialize in important volume. The machine tool industry expects to benefit from the modernization plan announced by A. W. Robertson, chairman of the Industrial Rehabilitation Committee, who is also chairman of the Westinghouse Electric & Mfg. Co.

While the trend of orders and inquiries thus far in September is not noticeably improved, the machine tool trade is encouraged by a more receptive attitude on the part of their customers, many of whom are willing to give information as to their potential requirements, which in most instances will not be filled until there is expansion in the markets for their own finished products.

In the automobile industry attention is being centered on preparations for new models, but no large amount of new equipment buying is yet in sight. Dodge Brothers are expected to purchase about $100,000 worth of new tools, but this is much below original estimates. The company had inquired for 150 presses.

Purchases of used tools are expanding in some districts.

NORTH ATLANTIC

LaCour Iron Works, Van Pelt Street and Borden Avenue, Long Island City, plans rebuilding part of plant recently destroyed by fire. Loss over $50,000 with equipment.

Osterman Steel Products Corpn., Long Island City, has been formed by George Reshen, care of Bergman & Bergman, 10 East Fortieth Street, New York, and others, to manufacture iron and steel products.

Peer Electric Co., Inc., Long Island City, has leased floor in building at Fortieth Avenue and twenty-third Street, for new electrical equipment manufacturing plant.

Lebensfeld Brothers, Inc., 163 Bowery, New York, manufacturer of store fixtures and equipment, leased six-story building, 34 x 103 ft., at 113 Bowery, for new plant, and will remove to that location.

Serg Romm, Inc., New York, has been organized by Serg Romm, 450 West End Avenue, and associates to manufacture metal products.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 20 for one metal-cutting bandsaw (Schedule 8685), one punch and shear machine (Schedule 8686), one sensitive radial drill, all motor driven (Schedule 8715), goggles, welders' helmets, welder's hand shields, and other mechanical equipment (Schedule 8721).

Sands Lubricants Co., 37-18 Twenty-second Street, Long Island City, oil lubricants, has leased building at Borden Avenue and Twenty-fifth Street, for new storage and distributing plant.

Village Council, Briarcliff, N. Y., plans installation of three or four 1,000,000-gal. capicity tanks for municipal water supply, with accessory equipment. H. B. Valentine, Briarcliff, is engineer.

Excel Lamp Co., New York, manufacturer of electric lamps, etc., has leased space in building at 30 East Twenty-third Street for establishment of plant.

Diehl-Ellis, Inc., Laurelton, L. I., has been organized by Conrad W. Diehl, 215 Morris Avenue, Rockville Center, L. I., and Clifford A. Ellis, 142-32 231st Place, Laurelton, to manufacture iron and steel products.

Board of City Commissioners, City Hall, New Brunswick, N. J., plans installation of electric-operated pumping machinery, with daily capacity of about 4,000,000 gal., filter equipment, tanks, chemical dry feed machines and other equipment in connection with extensions and improvements in water filtration plant and system. Cost over $250,000. City engineer in charge.

Pfister Chemical Co., care of Dr. Alfred Pfister, 342 Lexington Avenue, Clifton, N. J., manufacturer of industrial chemicals, etc., has awarded general contract to William J. Lange, Inc., 1025 Hoyt Avenue, Ridgefield, N. J., for new one-story plant in Morsemere district, Ridgefield. Cost about $40,000 with equipment.

North Jersey Iron & Steel Co., Jersey City, N. J., has been organized by P. Frank Dillon, Weehawken, N. J., and associates, to manufacture iron and steel specialties.

Healy Sewer Equipment Co., 53 Rome Street, Newark, N. J., manufacturer of basin and sewer cleaning equipment, is considering establishment of a branch plant at Evanston, Ill., to be operated in conjunction with Case tractor works at that place.

Tubular Finishing Machines, Inc., Paterson, N. J., has been organized by Grant Sipp, 557 East Twenty-eighth Street, and William J. Turner, 537 East Twenty-seventh Street, capital, $70,000, to manufacture tubular mechanical equipment and parts.

Wright Aeronautical Corpn., Paterson, N. J., has developed new nine-cylinder airplane motor, known as Wright Cyclone F engine, 670-hp. rating, and is placing unit in commercial production. Orders for 24 of these engines have been received from foreign countries.

Philadelphia Gas Works Co., Broad and Arch Streets, Philadelphia, has filed plans for new pumping plant at Balfour and Venango Streets.

Commanding Officer, Frankford Arsenal, Philadelphia, asks bids until Sept. 19 for one caliber .50 armor-piercing and tracer jacket trimming and burring machine (Circular 60).

Morris Oil Co., 2851 Huntington Park Avenue, Philadelphia, has leased land on Penrose Ferry Road, as site for new bulk oil storage and distributing plant and water terminal. Cost over $40,000 with equipment.

International Industries, Inc., Philadelphia, has leased floor in buliding at 54 North Seventh Street, for new plant for manufacture of electrical appliances and equipment.

State Highway Department, Harrisburg, Pa., let general contract to David Teitz & Son, Pottsville, Pa., for new equipment storage, service and repair building at Milford, Pa. Cost over $40,000 with equipment.

Pennsylvania Railroad Co., Wilmington, Del., has resumed operations at Todds Cut locomotive shops, following short curtailment, giving employment to full working quota.

Gowanda Plow Works, Main and Buffalo Streets, Gowanda, N. Y., manufacturer of plows and other farm implements, plans rebuilding part of plant recently destroyed by fire. Loss over $100,000 with equipment.

King Mfg. Corpn., 254 Rano Street, Buffalo, manufacturer of radio parts and equipment is increasing production schedule, recalling about 100 men, making total working quota of about 450 operatives.

Gamon Meter Co., 282 South Street, Newark, has arranged to use manufacturing, engineering, sales and service facilities of meter division of Worthington Pump & Machinery Corpn. Lines made by these two companies are supplemental to each other.

NEW ENGLAND

Sorensen Co., Omaha, Neb., manufacturer of knife sharpeners and kindred products, has taken over building at East Brookfield, Mass., for new Eastern branch works. One-story addition will be built.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 20 for one motor-driven tool cutter grinder (Schedule 8687), one motor-driven boring, drilling and milling machine (Schedule 8712), until Sept. 27, ventilation hull sets and spare parts (Schedule 8722) all for Portsmouth, N. H., Navy Yard; shaft revolution indicator equipments (Schedule 8720) for Portsmouth and Groton, Conn., navy yards; 88 phosphor bronze shells (Schedule 8713) for Newport, R. I., Navy Yard.

United Cast Magnet Corpn., Lawrence, Mass., has been organized by Harold M. Siskind and Marion R. Carbonneau, 201 Bay State Building, to manufacture mechanical products.

O. F. Mossberg & Sons, Inc., 201 Greene Street, New Haven, Conn., manufacturer of rifles, pistols, etc., has plans for one-story top addition to present one-story factory. Harrison Baldwin, New Haven, is architect.

Belleau & Malo Co., East Providence, R. I., recently organized by Joseph Belleau and Frank Malo, has taken over property at 1367 South Broadway for production of new type of radiators for domestic heating service, made primarily of copper plates.

Bureau of Yards and Docks, Navy Department, Washington, is planning extensions and improvements in power plant at Navy Yard, Charlestown, Mass. Cost about $100,000 with equipment. Extensions and betterments also are proposed in electric distribution system at same yard, to cost like sum.

C. I. Packer Tool & Die Co., Meriden, Conn., has changed its corporate name to Packer Machine Co.

SOUTH CENTRAL

Gulfport Port Commission, Gulfport, Miss., plans installation of high density compress equipment, conveying and handling machinery, and other mechanical equipment in new terminal on waterfront, consisting of five one-story units, 120 x 140 ft., two 140 x 240 ft., and one, 140 x 360 ft. Contract for buildings has been let to Williams Brothers, Exchange Bank Building, Tulsa, Okla. Cost about $150,000 with equipment.

Chamber of Commerce, Winchester, Ky., E. J. Beers, secretary, is at head of project

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New fads, new chemical combinations come and go in the field of metal cleaning, yet Wyandotte Metal Cleaners still remain the most modern and up-to-date of all because they are scientifically correct.

The principle of "balanced alkalies" is the fundamental basis of Wyandotte's super-efficient cleaning action. No mechanical mixture of chemicals can ever approach the results produced by the "balanced alkalies" which make up Wyandotte.

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Wyandotte
Metal Cleaners

to build airport on about 75 acre tract near Winchester-Lexington Road, including hangars, reconditioning and repair shops, and other field structures.

Henry Fischer Packing Co., Millwood Avenue, Louisville, meat packer, plans one-story plant. Cost about $35,000 with equipment.

Alpha Portland Cement Co., Birmingham, is reopening its local Phoenixville mill, following curtailment for several months, and large working force will be recalled.

SOUTH ATLANTIC

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until Sept. 30 for 1600 lb. malleable iron castings, 3000 lb. brass castings, 26 fire engine pumps, quantity of steel tubing, pipe, 26 automobile engines, 26 automobile steering gears, 26 gas tanks, 26 automobile radiator assemblies and other equipment (Circular 16).

Construction Service, Veterans' Administration, Washington, asks bids until Sept. 23 for 10 air compressors (Proposal 77-M); until Sept. 26 for 20 steel desks and 95 steel dressers (Proposal G-46).

Southern Engineering & Management Corpn., Jacksonville, Fla., has secured franchise for commercial gas service at Melbourne and neighboring communities, including Eau Gallie, Fla., and plans erection of artificial gas plant and pipe line system. Cost over $40,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 20 for sandblast room equipment (Schedule 8562), 75,000 lb. sheet steel (Schedule 8704) for Norfolk, Va., Navy Yard; until Sept. 27 for aircraft metal propeller blades and hubs (Schedule 8651), wire cloth (Schedule 8693), about 1500 gross spur grommets (Schedule 8690) for Eastern and Western yards; 26,800 lb. brass pipe and 1500 lb. copper pipe (Schedule 8706) for Boston or Los Angeles navy yards; eight main mooring winches and eight airship mooring yaw winches (Schedule 8696) for various navy yards.

Swift & Co., Union Stock Yards, Chicago, have purchased building at 520 West Bay Street, Jacksonville, Fla., and will install equipment costing about $70,000 for new branch plant. George Price is district manager at Tampa.

SOUTHWEST

Benson Brass & Chandelier Works, 1417 Agnes Street, Kansas City, Mo., has taken over building at Perry and Bellefontaine Avenues and will remodel for new plant, to replace works destroyed by fire.

Jayhawker Harvester Corpn., Kansas City, Mo., recently organized by William C. Edwards and Frank Wheatley, 6340 Walnut Street, plans manufacture of a new harvester and threshing machine. Parts will be produced at local machine works of Wheatley Brothers, 2505 Broadway, of which Mr. Wheatley, noted, is one of heads, and two or more assembling plants will be established soon in cities in agricultural districts.

St. Louis Southwestern Railway Co., St. Louis, has reopened locomotive repair shops at Pine Bluff, Ark., following shut down of about two months, reinstating 500 men.

Board of Works, Tulsa, Okla., plans installation of pumping machinery and auxiliary equipment in connection with extensions in municipal waterworks. T. C. Hughes is city planning engineer, in charge.

Quartermaster Supply Office, Fort Sam Houston, Tex., asks bids until Sept. 22 for 800 galvanized ash or water cans, 500 shovel handles, 500 scoop handles, padlocks and other supplies (Circular 37).

Texas Corpn., Houston, Tex., with headquarters at 135 East Forty-second Street, New York, plans extensions and improvements at oil storage terminal and distributing plant at Corpus Christi, Tex., including installation of new tanks with capacity of 75,000 bbl. and other mechanical equipment. Cost over $80,000 with equipment.

Schwan Burner Co., Dallas, Tex., has been organized by W. Schwan and William McCormick, 6105 Westchester Drive, to manufacture heaters and heating appliances, oil-burning equipment, etc.

Board of Education, Gladewater, Tex., plans manual training department in new two-story and basement high school, for which bids are being asked on general contract. Cost about $125,000. Voelker & Dixon, Perkins-Snider Building, Wichita Falls, Tex., are architects.

MIDDLE WEST

Chicago, Burlington & Quincy Railroad Co., Chicago, has advanced operations at locomotive and car shops at Aurora, Ill., and is now employing normal working quota of 650 men full time.

Chicago Electric Appliance Mfg. Co., 6617-25 Dorchester Avenue, has been organized by John L. Ward and David H. Rockolow, to manufacture electric appliances and equipment.

Gellman Mfg. Co., Rock Island, Ill., manufacturer of wrenches, tools, etc., has authorized plans for new one-story foundry. Cost about $35,000 with equipment. Cervin & Stuhr, Safety Block, are architects.

Echophone Radio Mfg. Co., Waukegan, Ill., manufacturer of radio equipment and sets, is stepping-up production schedule and will reinstate number of men for working quota of about 300.

Heetrozone Corpn., Minneapolis, has been formed by A. O. and O. M. Edwards, both of Minneapolis, capital $50,000, to manufacture heating and ventilating equipment.

City Council, Ainsworth, Neb., has plans for municipal electric light and power plant. Cost about $85,000 with equipment. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is consulting engineer.

John W. Rath Packing Co., Elm and Sycamore Streets, Waterloo, Iowa, meat packer, has asked bids on general contract for a five-story and basement lard refining unit, 60 x 60 ft. Cost over $65,000 with machinery. H. Peter Henschien, 59 East Van Buren Street, Chicago, is architect and engineer.

Indestructible Metallic Signs, Inc., 5305 Glenwood Avenue, Chicago, has been organized by Arthur V. Eilert and Charles Vrooman, to manufacture metal signs and displays.

City Council, Canton, S. D., has authorized surveys and estimates of cost for a municipal electric light and power plant. Preliminary estimates approximnte over $100,000 with machinery. Buell & Winter, Insurance Exchange Building, Sioux City, Iowa, are consulting engineers.

City Council, Staples, Minn., asks bids until Sept. 27 for equipment for addition to sewage treating works, including pumping machinery, filter equipment, piping, etc. A. A. Hawkinson, Detroit Lakes, Minn., is consulting engineer.

National Steel Container Corpn., 3132 West Fifty-first Street, Chicago, has been organized by Peter Cohn and associates, to manufacture steel and other metal containers.

Common Council, Lowden, Iowa, plans purchase of pumping machinery for municipal water service. H. R. Green Co., 417 First Avenue, S. E., Cedar Rapids, Iowa, is consulting engineer.

Foote Brothers Gear & Machine Co., Chicago, through Abel Davis and Franklin H. Fowler, its receivers in equity, announces that after Oct. 1 all manufacturing operations at Curtis Street plant will be carried on at Plamondon Division, 5301 South Western Avenue. Consolidation of gear and speed reducer operations in one plant is expected to effect substantial savings and to speed up deliveries.

Gordon Metals Corpn., 627 East Polk Street, Milwaukee, reports marked pickup in orders for non-ferrous ingots and inquiries are largest in volume in two years.

Jacobsen Mfg. Co., Racine, Wis., manufacturer of power lawn mowers, has taken over manufacture of motors from Johnson Outboard Motor Co., Waukegan, Ill., and transferred equipment to Racine. Jacobsen company will manufacture complete line of Johnson engines for trade, including makers of washing machines, air pumps, milking machines, sprayers, etc.

Common Council, Cassville, Wis., votes Sept. 20 on $40,000 bond issue for sewage plant and system. Work is in charge of W. G. Kirchhoffer, consulting engineer, 22 North Carroll Street, Madison, Wis.

Interstate Drop Forge Co., Milwaukee, reports August produced largest volume of new business in any month this year. First 10 days of September indicate improvement is being maintained.

General Hardware Corpn., Milwaukee, maker of tool grinders, power grinders, vises, etc., experienced 250 per cent increase in business in August, compared with July, according to Van B. Hooper, president.

Harry W. Belanger, Inc., Milwaukee, has been organized with $10,000 initial capital to take over business of Harry W. Belanger, 142 South Barclay Street, manufacturing and repairing boilers and doing general welding work.

Wisconsin Zinc Flotation Corpn., Madison, Wis., has been incorporated with $60,000 capital stock to undertake early development of several large lead and zinc fields near Linden, Wis. Principals are A. W. Kimball, J. S. Hartt and James J. McDonald.

PACIFIC COAST

Supervising Superintendent of Construction, Veterans Administration Hospital, Palo Alto, Cal., asks bids until Sept. 26 for one steel water tank and tower, including valves, piping, etc.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Sept. 28 for railroad tracks, metal clad partitions, air-conditioning, helium and gasoline systems for one-story hangar, and gasoline pumping and ethylizing building and equipment at naval air station, Sunnyvale, Cal. (Specification 6956); until Sept. 28 for railroad tracks for same station (Specification 7038).

International Smelting Co., Salt Lake City, Utah, subsidiary of Anaconda Copper Mining Co., 25 Broadway, New York, has authorized installation of new electric hoisting equipment, pumping machinery and air compressor at Rio Tinto mines, Tintic district. Company has work under way on 30-mile power transmission line from Jarbridge, Nev., to mining property, for electric power service.

Triangle Sheet Metal Co., Los Angeles, care of Benjamin J. Goodman, H. W. Hellman Building, has been organized by Mendel Glasser and associates to manufacture sheet metal products.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 27 for one precision lathe (Schedule 8680), two pedestal or floor-type grinders (Schedule 8672), one sander and grinder and one edger and sander (Schedule 8681), one wood-working shaper (Schedule 8673), one stationary upright head drill (Schedule 8703), one punch and shear (Schedule 8675), two sensitive drilling machines (Schedule 8697), one pattern-makers' lathe (Schedule 8674), one radial drilling machine (Schedule 8689), one 42-in. band saw (Schedule 8699), one drill grinder (Schedule 8707), all motor driven, for Mountain View, Cal., Naval Station; one motor-driven metal hacksaw (Schedule 8683), 24,100 lb. admiralty metal condenser tubes, and 3750 lb. admiralty metal evaporator tubes (Schedule 8708) for Puget Sound Navy Yard; until Oct. 4, one motor-driven oxygen service compressor, without motor (Schedule 8718) for Mare Island Navy Yard.

CENTRAL DISTRICT

American Show Case & Mfg. Co., 5235 Grand River Boulevard, Detroit, manufacturer of show cases, store fixtures, etc., has acquired Michigan Store Fixture Co., Detroit, and will consolidate. Purchasing company is planning to reopen branch plant at Adrian, Mich.

Production Die & Stamping Co., 6461 Walton Street, Detroit, has been organized by Alexander B. Cullon, 14640 Blackstone Avenue, and associates to manufacture dies, tools, stamped metal products, etc.

Kelvinator Corpn., 14250 Plymouth Avenue, Detroit, manufacturer of electric refrigerators, has plans for new division for production of air-conditioning equipment, including parts and assembling departments.

Lead Alloy Products Co., 6620 Walton Street, Detroit, has been organized by Louis A. Weil, address noted, and associates to manufacture gaskets, metal products, tools, etc.

Midwest Chemical Co., Inc., Lansing, Mich., recently organized to manufacture heavy industrial acids and chemicals, has taken over property at 421 East Shiawassee Street for establishment of plant. Kenneth G. Miller is president and general manager.

City Council, Farrell, Pa., plans installation of pumping machinery and other equipment for proposed municipal water plant. Cost $400,000 with machinery. J. A. Franek, mayor, is at head of project.

Cooper-Bessemer Corpn., Grove City, Pa., manufacturer of oil well equipment, gas engines, etc., is advancing production schedule, particularly for manufacture of parts.

Wendell August Forge, Inc., Grove City, Pa., manufacturer of aluminum and other metal forgings, is increasing production at recently established local plant and will add to working quota soon.

Board of Commissioners, Lawrence Park Township, Lawrence Park, Erie, Pa., is consid-

Here's Protection

for pipe lines subject to Atmospheric Corrosion

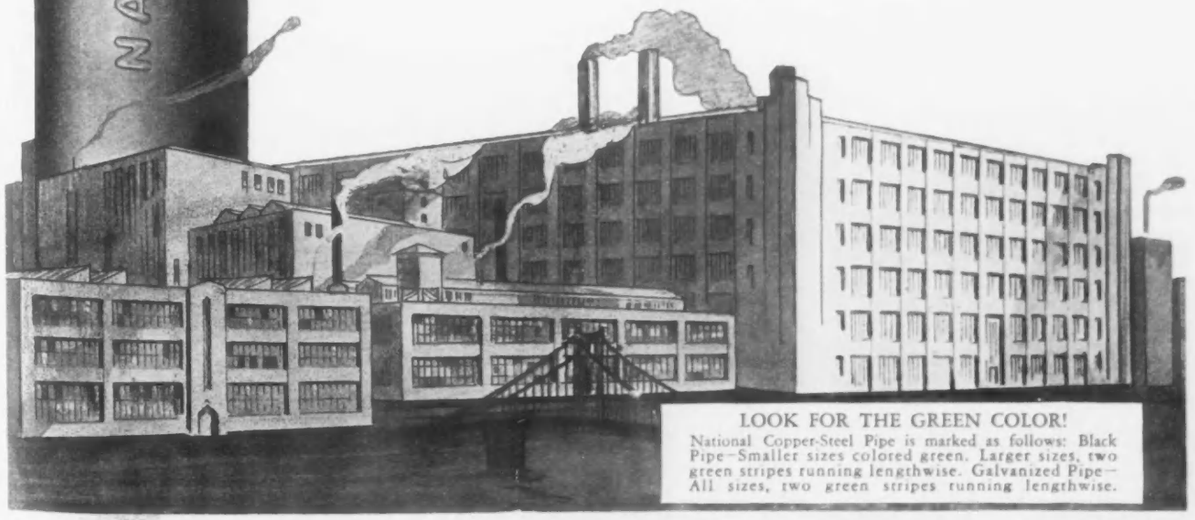
THE advantage of a copper content in steel, as a preventive of corrosion, is known to be most marked where alternate wet and dry conditions prevail. Under such conditions, generally indicated by the phrase, "atmospheric exposure", economy and satisfaction will reward the specification of NATIONAL Copper-Steel Pipe. The cost is little more than that of non-copper-steel and the difference will be well invested.

For soil, waste, vent lines, and rain leaders of various types of buildings and for exposed hand railings, pipe on bridges, flag poles, electric light and power poles and similar equipment subject to atmospheric corrosion, copper-steel pipe is unquestionably the logical choice. Many years of actual tests and service records have proved this. Ask for Bulletin 11, which gives full information concerning NATIONAL Copper-Steel Pipe—

The Original Copper-Steel Pipe

NATIONAL TUBE COMPANY · Pittsburgh, Pa.

Subsidiary of United States Steel Corporation



LOOK FOR THE GREEN COLOR!

National Copper-Steel Pipe is marked as follows: Black Pipe—Smaller sizes colored green. Larger sizes, two green stripes running lengthwise. Galvanized Pipe—All sizes, two green stripes running lengthwise.

NATIONAL COPPER-STEEL PIPE

ering erection of new power plant. J. J. Casby is head of committee in charge. Cost over $40,000 with equipment.

Hughes Provision Co., 3199 West Sixty-fifth Street, Cleveland, food packer, has taken out permit for two-story addition, 35 x 75 ft. Cost about $50,000 with equipment. H. M. Morse Co., Sloan Building, is architect.

Warren Tool & Forge Co., Warren, Ohio, property will be offered at public sale by Midland Bank, Cleveland, trustee in bankruptcy, on Sept. 30. Bondholders protective committee, headed by D. M. Bell and John Stewart, Warren, plan to purchase works and reorganize company, continuing in production of railroad tools and equipment. New organiziaton will arrange for bond issue of $100,000.

American Steel & Wire Co., Cleveland, has resumed operations at local Newburgh works, shut down since July 1, giving employment to about 400 men.

Glauber Brass Mfg. Co., Inc., Cleveland, has been organized, capital $30,000, by Orlo L. and Fred D. Prior, and associates, to take over company of same name at 7706 Platt Street, manufacturer of plumbers brass goods, etc.

City Council, Conneaut, Ohio, plans installation of pumping machinery and other equipment for municipal water supply system. Cost over $150,000 with machinery. George Champe & Associates, Nicholas Building, Toledo, Ohio, and J. N. Chester, Clark Building, Pittsburgh, are consulting engineers.

Electric Auto-Lite Co., Champlain and Mulberry Streets, Toledo, Ohio, manufacturer of electric lighting and starting equipment, is advancing production schedule and reinstating a large number of operatives.

Contracting Officer, Material Division, Wright Field, Dayton, Ohio, asks bids until Sept. 19 for 30 starter engaging pedals, 30 starter engaging pedal bracket assemblies, 40 starter engaging pedal bushings, 30 starter engaging cable assemblies, 30 starter engaging mechanism stops, 30 starting magneto handle tubes, 30 starting magneto handle front guide assemblies, 30 starting magneto cable assemblies, 70 starting magneto handle pins, 30 starting magneto handle stops, 400 oil temperature regulator mounting plates, and 200 oil temperature regulator support bracket assemblies (Circular 92); until Sept. 20, one power and control cabinet (Circular 95); until Sept 28, aluminum alloy tubing (Circular 97); until Oct. 3, six pairs of wheel and brake assemblies, 27-in. (Circular 106).

Ford Motor Co., Dearborn, Mich., has resumed operations at branch assembling works at Hamilton, Ohio, following shut down for about a month, reinstating 1100 men.

Ohio Power Co., Newark, Ohio, has approved plans for extensions and improvements in power lines near Lima, Ohio, including reconstruction of lines. Cost about $40,000.

City Council, Piqua, Ohio, has authorized immediate erection of a municipal electric light and power plant, for which plans were recently completed. Cost about $500,000 with equipment.

Vaporing Products, Inc., Cleveland, has been organized by George R. Sizer and C. F. McConnell, Engineers Building, and associates, to manufacture vaporizing equipment, etc.

Rossville Commercial Alcohol Corpn., Lawrenceburg, Ind., plans rebuilding part of plant recently destroyed by fire. Loss over $100,000 with equipment. Headquarters are at 122 East Forty-second Street, New York. Company is affiliated with American Solvents & Chemical Corpn., same address.

Showers Brothers Co., Bloomington, Ind., manufacturer of kitchen cabinets, etc., is advancing production and has reinstated about 400 employees.

Pittsburgh Plate Glass Co., Grant Building, Pittsburgh, has awarded general contract to Thomas A. Moynahan Construction Co., Union Title Building, Indianapolis, for one-story factory branch and distributing plant, 82 x 320 ft., at Indianapolis. Cost over $60,000 with equipment. Art Fleck, Union Title Building, Indianapolis, is architect.

Superior Automatic Heating Co., Inc., Fort Wayne, Ind., has been organized by C. P. Meyer and Edwin R. Thomas, Fort Wayne, to manufacture heating equipment.

Marion Tool Works, Inc., Marion, Ind., has filed notice of company dissolution under State laws.

Tyler Sales Fixture Co., Muskegon Heights, Mich., manufacturer of store fixtures, etc., has acquired property at Niles, Mich., and plans early removal of plant to that location, where capacity will be increased.

Ishpeming Gold Mining Co., Ishpeming, Mich., recently organized by Albert Bjork and Frank W. Lundin, both of that place, to take over Ropes gold mining properties near city, is arranging fund for development of mines and installation of equipment.

Chevrolet Motor Co., West Grand Boulevard, Detroit, is arranging for closing of branch assembling plant at Janesville, Wis., and will transfer operations to another location. Company will continue a parts distributing branch at Janesville.

◀ FOREIGN ▶

Firestone Tire & Rubber Co., Akron, Ohio, has organized new subsidiary, Spanish Firestone Tire & Rubber Co., Madrid, Spain, to erect a new plant in Spain. Cost more than $500,000 with machinery.

Swiss State Railways, Berne, Switzerland, plan new hydroelectric generating plant on plateau of Etzel, near Einsiedeln, Switzerland, in connection with railway electrification program, with capacity of 110,000 hp. Cost about 62,000,000 fr. (approximately $11,966,000), including transmission and distributing lines, power switching stations and auxiliary structures.

Dr. Mohammad Haidar, Bagdad, Iraq, has secured concession from State Ministry for Traffic and Industry for new cement mill near Kifrin, where large tract of raw material lands has been secured, and will organize company with capital of £800,000 (about $2,800,000) to carry out project. Plant will cost over $1,000,000 with machinery.

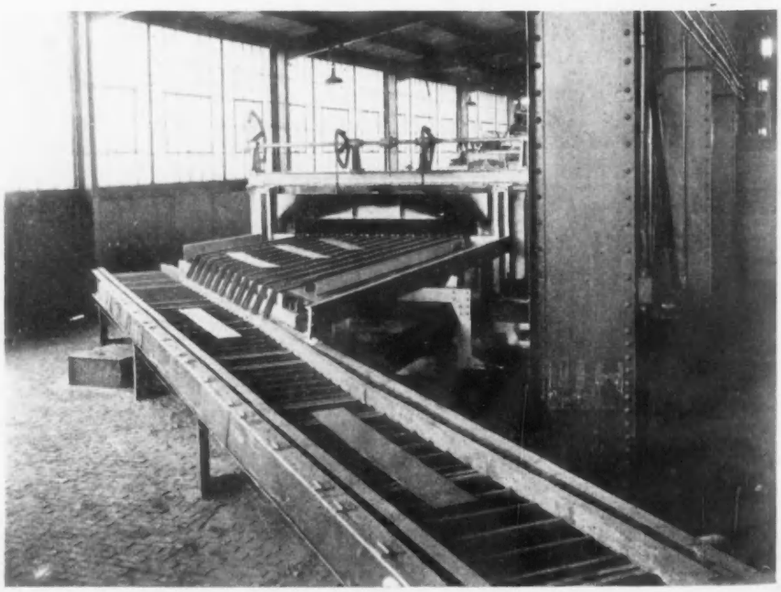
Oriental Rayon Mills, Ltd., Shiga, Japan, plan new mill for production of rayon near present plant. Cost over $350,000 with machinery.

State Ministry for Traffic and Industry, Bagdad, Iraq, division of irrigation, plans installation of pumping machinery and other power equipment in connection with irrigation projects using Dscharaf River as source of supply. Work will include construction of dams at Habanyieh and Tauileh, and diversion works, scheduled to begin in January. Cost about £2,000,000 (approximately $7,000,000). Arrangements for engineering work and financing will soon be made.

Soviet Russian Government, Moscow, has authorized three new hydroelectric generating plants on Volga River, with gross output of 2,000,000 kw. One plant will be located at Kamishin, Lower Volga district, and other two near Ivanovo-Voznesensk and Nizhni Novgorod, respectively. Government has organized Central Volga Construction Bureau (Sredvolgostroy) to carry out project. Plans will be completed in fall. All three stations are scheduled for service in early part of 1935. Cost over 120,000,000 rubles (about $60,000,000). Amtorg Trading Corpn., 261 Fifth Avenue, New York, is official buying agency.

Live Roller Conveyor Brings Strip Steel from Furnace Discharge to Roller Leveller

AT the discharge end of a normalizing furnace at the Sharon, Pa., works of the Sharon Steel Hoop Co., a live roller chain-driven conveyor is used to carry strip steel away from the furnace to the roller leveller shown in the foreground. The conveyor has a variable surface speed range of 150 to 300 ft. per min. The rollers of the conveyor tread are of seamless steel, 2 9/16-in. diameter, heavy gage tubing, set on approximately 7½-in. centers, every other roller being driven. All rollers are equipped with pressure-lubricated ball bearings, which incorporate a labyrinth seal and grease retainer especially fitting this unit for the conditions at hand. The equipment was designed and installed by the Mathews Conveyer Co., Ellwood City, Pa.



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THE STANDARD QUALITY GRADE

The general satisfaction which J & L STANDARD Spring Wire gives, marks it as a product on which spring manufacturers can safely standardize. It lends itself readily to the crimps, knots and other forming incident to spring making. The correct balance of strength, resilience, toughness and easy working qualities is the result of J & L complete control of steel making and wire drawing. It is a doubtful economy which relies on less than J & L STANDARD quality.

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Wire Rods
Cold Heading Wire
Basic and Bessemer Wood Screw Wire
Basic and Bessemer Screw Stock Wire
Standard Spring Wire
Bright, Annealed and Galvanized Wire
Bright, Galvanized and Coated Nails
Polished and Galvanized Staples
Galvanized Barbed Wire
Woven Wire Fence

JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS
JONES & LAUGHLIN BUILDING, PITTSBURGH, PENNSYLVANIA

Sales Offices: Atlanta Boston Buffalo Chicago Cincinnati Cleveland Dallas Detroit Erie Los Angeles Memphis Milwaukee New Orleans New York Philadelphia Pittsburgh St. Louis San Francisco
Warehouses: CHICAGO CINCINNATI DETROIT MEMPHIS NEW ORLEANS PITTSBURGH
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Studies of Seasonal Characteristics

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Step Three—Median Link Relatives

We now have five annual values for each of the 12 months. The median again comes into use, by developing one for each month in the series. When this is completed we shall have one value for each month instead of five, which will be representative of that month, in either production, man-hours or stock on hand. These three sets of medians are found in the column so labeled in Tables 7, 8 and 9.

Step Four—Chain Relatives

The representative values which we now have are actuated by a shifting base, i.e., with each month as a base for the following. The next step consists of relating each of these median relatives to a constant base. For this purpose we pick one month as a constant (January is used here) and call it 100. The February chain relative would then be 100 x 0.875 (i.e., 100 times the median link relative of February) or 87.5. The March chain relative is equal to the product of the March median link relative by the February chain relative or 87.5 x 1.038 = 90.8. The chain relatives, then, are found by multiplying the median link relative of the desired month by the chain relative of the preceding month. These chain relatives are also found in Tables 7, 8 and 9.

Step Five—Adjusted Chain Relatives

Theoretically, the product of December chain relative and January median link relative should equal the value of 100 given to January. Actually this develops to be 97.1 x 111.0 = 107.8 or an error of 7.8. What has happened here is simply that the underlying secular trend spoken of at the beginning of this article which is present in the five-year period has been compounded 12 times, resulting in a total increase over 100 of 7.8. In order to secure purely seasonal values, it is necessary to eliminate this trend. This rate of growth is nothing more nor less than compound interest which is calculated by the following formula:

$$P_n = P_o(1+r)^n$$

Where:

P_n = Amount at end of "n" period of time

P_o = Fixed sum

r = Rate of growth of fixed sum

n = Number of periods of time

Transposed, the above formula reads:

$$r = \sqrt[n]{\frac{P_n}{P_o}} - 1$$

Substituting the given values, we have:

$$r = \sqrt[12]{\frac{107.8}{100}} - 1$$

The calculation is most easily performed through the use of logarithms, and it is suggested that, inasmuch as nearly all offices have among their staff some one capable of using logarithms, the values be turned over to him, the solution involving about 5 min.

Following is the solution of r for the production data, carried out from the latter equation:

$$r = \sqrt[12]{1.078} - 1$$

$\sqrt[12]{1.078} = \log.\ 1.078 \div 12$

$\log.\ 1.078 = .03262$

$.03262 \div 12 = .00171$

$.00171 = \log.\ 1.004$

$r = 1.004 - 1$

$r = .004$

The rate of growth has been 0.004 per month in the case of production. To adjust the chain relatives to this secular trend, the relative for each month must be divided by $(1 + r)^n$ i.e., February by $(1 + r)$ or $87.5 \div 1.004$. March is divided by $(1 + r)^2$ i.e., $90.8 \div 1.008$. April is divided by $(1 + r)^3$ i.e., $77.7 \div 1.012$, and so on throughout the year in each of the three series of data by its individual value of r. These adjusted chain relatives, so labeled, are found in Tables 7, 8 and 9.

The actual index is computed by first averaging the adjusted chain relatives and then calculating the relation of each chain to the average so derived. The average of all the production adjusted chain relatives is equal to 83.7. The January index of production will then be equal to the relation of January adjusted chain relative to this index or 100 to 83.7 = 103.4. These indices, one set for each series of data, complete the seasonal variation study, and afford a characteristic curve for each of the three subjects.

The seventh step in this analysis is not involved in the study of seasonal variation except as it affects the particular problem. It consists of converting the indices of each group of data to actual values in units or hours. The work is carried out simply by securing first, as a base, the average monthly valuation of each group and then multiplying these averages through the respective indices. These values are shown in the columns in Tables 7, 8 and 9, labeled "times base." This gives us a series of normal values for each month in terms of units and hours from which we can determine the actual or characteristic number of units produced per man-hour each month. The chart, Fig. 2, tells us that the maximum units per man-hour reached 12.16 and the minimum 10.08. The variance would then be 2.08, or practically three units per man-hour. The average monthly rate was 10.93 and this variance of 2.08 is divided above and below this line. The following table shows the variation from the line of average in the chart, Fig. 3:

Month	+	—
January	1.08	
February	0.15	
March	0.92	
April		0.64
May		0.23
June		0.85
July		0.78
August	1.23	
September	0.14	
October		0.32
November		0.62
December	0.03	
	3.55	3.46

Fifty and six-tenths per cent of the variance was above the average and 49.4 per cent was below, or 1.05 units per man-hour variance above average, and 1.03 units variance below.

There are many uses possible in seasonal variance analyses. In some cases a unit per man-hour analysis, such as the one above, would be more accurately determined by substituting shipments, in monthly units, for production figures. This is purely an individual matter. The fact remains that much is to be gained by extending fact-finding procedure and activity below the surface or superficial statistics generally sought after. It is a problem somewhat similar to that of the research engineer who not only tests his product from the standpoint of market appeal and other surface data, but also digs into it, examining its innermost mechanical devices and their characteristics, reactions and peculiarities. There is no reason why the technician should know more, comparatively speaking, about the "innards" than his brother, the commercial engineer.

Lacquer Veneer Provides Decorative Coatings

(*Concluded from Page 407*)

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